Surgical approach to hysterectomy for benign gynaecological disease (Review)

Nieboer TE, Johnson N, Lethaby A, Tavender E, Curr E, Garry R, van Voorst S, Mol BWJ, Kluivers KB

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[Intervention Review]

Surgical approach to hysterectomy for benign gynaecological disease

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ABSTRACT

Background

The three approaches to hysterectomy for benign disease are abdominal hysterectomy (AH), vaginal hysterectomy (VH), and laparoscopic hysterectomy (LH). Laparoscopic hysterectomy has three further subdivisions depending on the part of the procedure performed laparoscopically.

Objectives

To assess the most beneficial and least harmful surgical approach to hysterectomy for women with benign gynaecological conditions.

Search strategy

We searched the Cochrane Menstrual Disorders and Subfertility Group Specialised Register of controlled trials (15 August 2008), CENTRAL (*The Cochrane Library* 2008, Issue 3), MEDLINE (1950 to August 2008), EMBASE (1980 to August 2008), Biological Abstracts (1969 to August 2008), the National Research Register, and relevant citation lists.

Selection criteria

Only randomised controlled trials comparing one surgical approach to hysterectomy with another were included.

Data collection and analysis

Independent selection of trials and data extraction were employed following Cochrane guidelines.

Main results

There were 34 included studies with 4495 women. The benefits of VH versus AH were speedier return to normal activities (mean difference (MD) 9.5 days), fewer febrile episodes or unspecified infections (odds ratio (OR) 0.42), and shorter duration of hospital stay (MD 1.1 days). The benefits of LH versus AH were speedier return to normal activities (MD 13.6 days), lower intraoperative blood loss (MD 45 cc), a smaller drop in haemoglobin (MD 0.55 g/dl), shorter hospital stay (MD 2.0 days), and fewer wound or abdominal wall infections (OR 0.31) at the cost of more urinary tract (bladder or ureter) injuries (OR 2.41) and longer operation time (MD 20.3 minutes). The benefits of LAVH versus TLH were fewer febrile episodes or unspecified infection (OR 3.77) and shorter operation time (MD 25.3 minutes). There was no evidence of benefits of LH versus VH and the operation time (MD 39.3 minutes) as well as substantial bleeding (OR 2.76) were increased in LH. For some important outcomes, the analyses were underpowered to detect important differences or they were simply not reported in trials. Data were absent for many important long-term outcome measures.

Authors' conclusions

Because of equal or significantly better outcomes on all parameters, VH should be performed in preference to AH where possible. Where VH is not possible, LH may avoid the need for AH however the length of the surgery increases as the extent of the surgery performed laparoscopically increases. The surgical approach to hysterectomy should be decided by the woman in discussion with her surgeon in light of the relative benefits and hazards.

PLAIN LANGUAGE SUMMARY

Surgical approach to hysterectomy for benign gynaecological diseases

Abdominal hysterectomy involves removal of the uterus through an incision on the lower abdomen. Vaginal hysterectomy involves removal of the uterus via the vagina, with no abdominal incision. Laparoscopic hysterectomy involves 'keyhole surgery' with small incisions on the abdomen. In laparoscopic hysterectomy, the uterus is removed with the aid of a surgical telescope (laparoscope) inserted through the umbilicus (belly button) and instruments inserted through two or three further keyholes. Laparoscopic hysterectomy may be further subdivided depending on the extent of the surgery performed laparoscopically compared to that performed vaginally. More recently, laparoscopic hysterectomy can be performed with the use of a so-called robot which is operated from a distance by the surgeon.

Vaginal hysterectomy should be performed in preference to abdominal hysterectomy, where possible. This review found that vaginal hysterectomy meant quicker return to normal activities, fewer infections and episodes of raised temperature after surgery, and a shorter stay in hospital compared to abdominal hysterectomy.

Laparoscopic hysterectomy meant quicker return to normal activities, less blood loss and a smaller drop in blood count, a shorter stay in hospital, and fewer wound infections and episodes of raised temperature after surgery compared to abdominal hysterectomy, but laparoscopic hysterectomies have a greater risk of damaging the bladder or ureter (the tube leading to the bladder from the kidney) and are longer operations.

No benefits were found for laparoscopic versus vaginal hysterectomy. Laparoscopic hysterectomies are longer operations associated with a higher rate of substantial bleeding.

The authors concluded that vaginal hysterectomy should be performed in preference to abdominal hysterectomy, where possible. Where vaginal hysterectomy is not possible, a laparoscopic approach may avoid the need for an abdominal hysterectomy. Risks and benefits of different approaches may however be influenced by the surgeon's experience. More research is needed, particularly to examine the long-term effects of the different types of surgery.

BACKGROUND

Description of the condition

Hysterectomy is the surgical removal of the uterus and is the

most frequently performed major gynaecological surgical procedure with millions of procedures performed annually throughout the world (Garry 2005). Hysterectomy can be performed for benign and malignant indications. Approximately 90% of hysterectomies are performed for benign conditions, such as fibroids causing abnormal uterine bleeding (Flory 2005).

The first reported elective hysterectomy was performed through a vaginal approach by Conrad Langenbeck in 1813. The first elective abdominal hysterectomy, a subtotal operation (where the cervix was conserved), was performed by Charles Clay of Manchester in 1863 (Sutton 1997). These approaches remained the only two options until the latter part of the 20th century. The first laparoscopic-assisted vaginal hysterectomy (LAVH) was performed by Harry Reich in 1989 (Reich 1989). He also reported the first total laparoscopic hysterectomy (TLH) in 1993.

Description of the intervention

Approaches to hysterectomy may be broadly categorised into three options, abdominal hysterectomy (AH); vaginal hysterectomy (VH); and laparoscopic hysterectomy (LH) where at least some of the operation is conducted laparoscopically (Garry 1994).

The AH has traditionally been the surgical approach for gynaecological malignancy, when other pelvic pathology is present such as endometriosis or adhesions, and in the context of an enlarged uterus. It remains the 'fallback option' if the uterus cannot be removed by another approach.

The vaginal approach (VH) was originally used only for prolapse but has become more widely utilised for menstrual abnormalities such as dysfunctional uterine bleeding (DUB), when the uterus is a fairly normal size. Compared to AH, VH was (and still is) regarded as less invasive and seemed to have the advantages of fewer blood transfusions, less febrile morbidity (fever), and less risk of injury to the ureter, but the disadvantages are more bleeding complications and greater risk of bladder injury (Harris 1996).

The term 'laparoscopic hysterectomy' (LH) usually refers to a hysterectomy where at least part of the operation is undertaken laparoscopically (Garry 1994). This approach requires general laparoscopic surgical expertise. The proportion of hysterectomies performed by LH has gradually increased and, although the surgery tends to take longer, its proponents argue that the main advantages are the possibility to diagnose and treat other pelvic diseases such as endometriosis, to carry out adnexal surgery including the removal of the ovaries, the ability to secure thorough intraperitoneal haemostasis (direct laparoscopic vision enables careful sealing of bleeding vessels at the end of the procedure), and a more rapid recovery time from surgery compared to AH (Garry 1998). More recently, three sub categorisations of LH have been described (Reich 2003), as follows.

- Laparoscopic assisted vaginal hysterectomy (LAVH) is where part of the hysterectomy is performed by laparoscopic surgery and part vaginally, but the laparoscopic component of the operation does not involve division of the uterine vessels.
- Laparoscopic hysterectomy (which we will abbreviate to LH(a)) is where the uterine vessels are ligated laparoscopically but part of the operation is performed vaginally.
- Total laparoscopic hysterectomy (TLH) is where the entire operation (including suturing of the vaginal vault) is performed laparoscopically and there is no vaginal component except for the removal of the uterus. TLH requires the highest degree of laparoscopic surgical skill. It has been unclear whether TLH offers any benefit over other forms of laparoscopic hysterectomy.

A total hysterectomy is the removal of the entire uterus including the cervix. When the cervix is not removed this is known as a subtotal or supracervical hysterectomy. Subtotal hysterectomies are most easily performed abdominally or laparoscopically, although it is possible to conserve the cervix in a VH or LAVH (Lethaby 2006).

In common with the overall hysterectomy rate, the proportion of hysterectomies currently being performed by different approaches varies markedly across countries, within countries, and even between individual surgeons working within the same unit. The surgical approach taken at hysterectomy continues to depend upon the experience and biases of the surgeon (Johns 1995). Each gynaecologist will have different indications for the approach to hysterectomy for benign disease, based largely on their own array of surgical skills and the patient characteristics such as uterine size and descent, extra-uterine pelvic pathology, previous pelvic surgery, and other features such as obesity, nulliparity, and the need for oophorectomy. Even though vaginal hysterectomy has been widely considered to be the operation of choice for abnormal uterine bleeding, the VALUE study has shown that, in 1995 in the UK, 67% of the hysterectomies performed for this indication were abdominal hysterectomies (Maresh 2002). Previous caesarean section, for example, is often considered to be a contraindication for vaginal hysterectomy. However, this is not supported by evidence as analysis of cumulative data of four studies available on the subject did not find a significant difference in complication rates in hysterectomy patients following caesarean section (Agostini 2005). Mäkinen 2001 reported a prospective study on the learning curve in 10,110 hysterectomies for benign indications, of which 5875 were abdominal, 1801 were vaginal, and 2434 were laparoscopic hysterectomies. As far as injuries to adjacent organs were concerned, the surgeons' experience significantly correlated inversely with the occurrence of urinary tract injuries in laparoscopic hysterectomy and the occurrence of bowel injuries in vaginal hysterectomy. Encouraging vaginal surgery amongst gynaecologists has been shown to be an effective method of increasing vaginal hysterectomy rates. Finland had a vaginal hysterectomy rate as low as 7% in the 1980s. Following annual meetings on gynaecological surgery where vaginal and laparoscopic surgery were encouraged, and individual training provided, the vaginal hysterectomy rate increased to 39% in 2004 (Brummer 2008). In the same period of

time the ureter injuries decreased, which represents an impressive national learning curve.

How the intervention might work

Injuries to adjacent organs are of concern in hysterectomy and their rates of occurrence differ with the various approaches to hysterectomy and surgical experience level (Mäkinen 2001). Furthermore, operation times differ with the different approaches to hysterectomy. In general it is presumed that the laparoscopic approach is followed by a quicker recovery as compared with open surgery. Apart from the surgical approach to hysterectomy, other aspects of the surgical technique may have an effect on the outcome of surgery. Examples of this include total versus subtotal (where the cervix is not removed) hysterectomy (Lethaby 2006); Doderlein VH or LAVH versus standard VH or LAVH; techniques to support the vaginal vault; bilateral elective oophorectomy versus ovarian conservation (Orozco 2008); and other strategies used mainly by those conducting laparoscopic surgery with the aim of reducing the likelihood of complications, including the use of vaginal delineators, rectal probes, and illuminated ureteric stents. These other aspects are not be within the scope of this review (other than for assessing trial quality), which will focus simply on benefits and harms of the different surgical approaches.

Why it is important to do this review

It was interesting to note that in 1998 there was not a single randomised controlled trial (RCT) comparing AH and VH (Garry 1998). The introduction of the newer approaches to hysterectomy (LAVH, LH(a) and TLH) has stimulated a much greater interest in the proper scientific evaluation of all forms of hysterectomy. The findings of various randomised controlled trials are summarised in this systematic review.

OBJECTIVES

The aim of the review was to assess the most beneficial and least harmful surgical approach to hysterectomy when considering abdominal hysterectomy (AH), vaginal hysterectomy (VH), and laparoscopic hysterectomy (LH) for women with benign gynaecological conditions.

METHODS

Criteria for considering studies for this review

Types of studies

Randomised controlled trials (RCTs) where one surgical approach to hysterectomy was compared with another.

Types of participants

Inclusions: women undergoing hysterectomy for benign disease (including uterine fibroids).
Exclusions: women with gynaecological cancer. Where trials included both women with benign and malignant disease, authors were requested for a breakdown of data in order to include only women with benign disease. Trials were excluded if this information was not forthcoming. There were no such trials.
Dropouts were defined as cases where: participation was refused or hysterectomy was cancelled after randomisation, the assigned procedure was refused, or randomised cases were excluded from analysis by the researchers. Losses to follow up were not regarded as dropouts.

Types of interventions

The surgical approach to removal of the uterus where at least one approach was compared with another. Approaches were, for example, AH, VH, and LH.
AH involves removal of the uterus through an incision on the lower abdomen. VH involves removal of the uterus via the vagina, with no abdominal incision. The distinction between the subcategories of LH was made based on whether ligation of the uterine vessels was undertaken laparoscopically and whether suturing of the vaginal vault was undertaken vaginally (see Table 1). Thus LH was further subdivided in the analysis into LAVH (where the laparoscopic component did not involve ligation of the uterine vessels), LH(a) (where the uterine vessels were ligated laparoscopically but there was still some vaginal component), TLH (where the entire hysterectomy was completed laparoscopically with no vaginal component other than the removal of the uterus), and non-categorisable LH (where there was insufficient information or the types of LH were too heterogeneous to otherwise sub categorise). There are two other classifications of LH (Nezhat 1995; Richardson 1995) and these are summarised in Table 2 and Table 3.

Table 1. Sub-categorisation of laparoscopic hysterectomy

Type of LH	LH versus AH RCTs	LH versus VH RCTs
LAVH	Ferrari 2000	Agostini 2006
	Kunz 1996	Ottosen 2000
	Marana 1999	
	Muzii 2007	
	Ottosen 2000	
	Raju 1994b	
	Tsai 2003	
LH(a)	Ellstrom 1998	Darai 2001
	Falcone 1999	Hwang 2002
	Harkki-Siren 2000	Soriano 2001
	Hwang 2002	Summitt 1992
	Langebrekke 1998	
	Olsson 1996	
	Persson 2006	
	Schutz 2002	
	Seracchiolo 2002	
	Summitt 1998	
	Yuen 1998	
TLH	Kluivers 2007	Morelli 2007
	Perino 1999	Ribiero 2003
	Ribiero 2003	
Non-categorisable LH	Garry 2004	Garry 2004
	Lumsden 2000	Richardson 1998

LAVH = laparoscopic assisted vaginal hysterectomy, where part of the hysterectomy is performed by laparoscopic surgery and part vaginally, but the laparoscopic component of the operation does not involve division of the uterine vessels

LH(a) = laparoscopic hysterectomy, where the uterine vessels are ligated laparoscopically but part of the operation is performed vaginally
TLH = total laparoscopic hysterectomy, where the entire operation (including suturing of the vaginal vault) is performed laparoscopically and there is no vaginal component
LSH = laparoscopic subtotal hysterectomy

Table 2. Staging of laparoscopic hysterectomy - Richardson 1995

Stage	Laparoscopic content
0	Laparoscopy done but no laparoscopic procedure before vaginal hysterectomy
1	Procedure includes laparoscopic adhesiolysis and/or excision of endometriosis
2	Either or both adnexa freed laparoscopically
3	Bladder dissected from the uterus laparoscopically
4	Uterine artery transected laparoscopically
5	Anterior and/or posterior colpotomy or entire uterus freed laparoscopically

Table 3. Steps of laparoscopic hysterectomy - Nezhat 1995

Step	Laparoscopic content
1	Severing the round ligaments and dissection of the upper portion of the broad ligament
2	Severing the tubo-uterine junction and the utero-ovarian ligament if the adnexa are to be preserved, or severing the infundibulopelvic ligaments
3	Severing the uterine vessels
4	Preparation of the bladder flap
5	Severing the cardinal uterosacral ligaments complex
6	Performing anterior and posterior culdotomy and separation of the cervix
7	Closure of the vaginal cuff

Subtotal versus total hysterectomy is the scope of another Cochrane review (Lethaby 2006) and trials making this comparison were excluded from the present review. Trials evaluating different surgical approaches to subtotal hysterectomy were also excluded. However, if a minority of the trial women had a subtotal hysterectomy and the comparison was made between any of the three approaches outlined above then the trial was included.

LH subcategories: LAVH is where the laparoscopic component does not involve ligation of the uterine vessels; LH(a) is where the

uterine vessels are ligated laparoscopically but there is still some vaginal component; and TLH is where the entire hysterectomy is completed laparoscopically with no vaginal component other than the removal of the uterus. Non-categorisable LH was where there was insufficient information, or the types of LH were too heterogeneous to otherwise sub categorise.

Types of outcome measures

The following outcome measures were defined as the primary outcomes (Johnson 2005b; Kluivers 2008).

Primary outcomes

- Return to normal activities
- Satisfaction and quality of life
- Intra-operative visceral injury
  - Bladder injury
  - Ureter injury
  - Urinary tract (bladder or ureter) injury
  - Bowel injury
  - Vascular injury
- Major long-term complications
  - Fistula
  - Pelvi-abdominal pain
  - Urinary dysfunction
  - Bowel dysfunction
  - Pelvic floor condition (prolapse)
  - Sexual dysfunction

Secondary outcomes

- Operation time
- Other intra-operative complication
  - (Sequelae of) bleeding
    - Substantial bleeding
    - Haemoglobin or haematocrit drop
    - Transfusion
    - Pelvic haematoma
  - Unintended laparotomy for approaches not involving routine laparotomy
- Short-term outcomes and complications
  - Length of hospital stay
  - Infections
    - Vaginal cuff
    - Abdominal wall or wound
    - Urinary tract infection
    - Febrile episodes or unspecified infections
  - Thromboembolism
- Costs

Note: data on the cost of treatment were sought but it was intended to describe these data qualitatively and not to include the information in the meta-analysis since 'cost' could be defined differently in different studies depending upon whether studies incorporate the cost of sequelae. Different healthcare systems could produce markedly different results.

Search methods for identification of studies

The Trials Search Co-ordinator of the Cochrane Menstrual Disorders and Subfertility Group was involved in the definition of search terms and the searches.

Electronic searches

The search for trials will be repeated every two years and the review updated if new trials are found.
There were no language restrictions applied.
See the following appendices Appendix 1, Appendix 2; Appendix 3 and Appendix 4 for the strategies used for the electronic data bases searched.
The National Research Register (NRR) is a register of ongoing and recently completed research projects funded by or of interest to the United Kingdom's National Health Service, as well as entries from the Medical Research Council's Clinical Trials Register, and details on reviews in progress collected by the NHS Centre for Reviews and Dissemination. The register was searched for any trials with the following keywords.
1. Hysterectomy
2. Abdominal
3. Vaginal
4. Laparoscopic assisted
5. Laparo-vaginal
6. Laparoscopic
7. 1 and 2 or 3 or 4 or 5 or 6

The Clinical Trials register, a registry of federally and privately funded US clinical trials, was searched for the same keywords.

Searching other resources

The citation lists of relevant publications, review articles, abstracts of scientific meetings, and included studies were also searched.

Data collection and analysis

Selection of studies

The selection of trials for inclusion in the initial review was performed by at least two of four review authors (ET, EC, AL, NJ) after employing the search strategy described previously. Selection

of trials for the update was performed by two different review authors (TN, KK). Differences of opinion were resolved by consensus after consultation with one or two other review authors.
Trials were excluded from the review if they made comparisons other than those specified above. These trials were detailed in the table 'Characteristics of excluded trials'.

Data extraction and management

Data extraction

The following data were collected from the included studies.

- Trial characteristics
  - Method of randomisation, in order of preference, as follows:
    - third party randomisation, for example by pharmacy, computer, or telephone;
    - true randomisation by carer, for example by opaque numbered envelope or register;
    - not stated.
  - Study design:
    - blinding;
    - duration of follow up;
    - type of follow up.
  - Size of study:
    - number of women recruited;
    - number of women randomised;
    - number of women excluded;
    - number of women withdrawn and lost to follow up;
    - number of women analysed.
  - Study setting:
    - single centre or multicentre;
    - location;
    - timing and duration;
    - source of funding stated or not.
  - Analyses:
    - whether a power calculation was performed and adhered to;
    - whether 'intention-to-treat' analysis was performed by authors, was possible from the data but not performed by authors, not possible or uncertain.
  - Criteria for hysterectomy:
    - indications specified;
    - data broken down by indications for hysterectomy.
- Characteristics of the study participants
  - Baseline characteristics:
    - age;
    - parity;
    - indication for hysterectomy;
    - investigative work up, for example pelvic ultrasound scan, endometrial sampling;
    - previous treatments;
    - exclusion criteria.
  - Treatment characteristics:
    - pre-operative preparation, for example pre-operative medical treatment;
    - level of training of surgeons.
- Interventions
  - Total or subtotal hysterectomy
  - Subcategory in case of LH (i.e. LAVH, LH(a), and TLH)
  - Use of technique to support the vaginal vault
  - Proportion undergoing bilateral elective oophorectomy versus ovarian conservation
  - Other strategies to reduce the likelihood of complications
  - Absence of co-interventions in treatment and control groups
  - If the trial compared a surgical approach performed by one (group of) surgeon(s) with another surgical approach performed by a second (group of) surgeon(s)
- Outcomes
  - Operating time
  - Immediate complications of surgery
    - Surgical injury:

urinary tract (bladder or ureter) injury;
bladder injury;
ureter injury;
bowel injury;
vascular injury.

    - Bleeding
    - Unintended laparotomy for approaches not involving routine laparotomy
  - Short-term outcomes
    - Pain
    - Sequelae of bleeding:

haemoglobin/haematocrit drop;
transfusion;
pelvic haematoma.

    - Infection:

vaginal cuff;
abdominal wall or wound;
urinary tract infection (UTI);
febrile episodes or unspecified infection.

    - Thrombo-embolism
    - Perioperative mortality
  - Recovery from surgery
    - Length of hospital stay
    - Return to normal activities
  - Long-term outcomes
    - Fistula
    - Pelvi-abdominal pain
    - Urinary dysfunction

- ◇ Bowel dysfunction
- ◇ Pelvic floor condition (prolapse)
- ◇ Sexual dysfunction
- ◇ Satisfaction, quality of life

○ Costs

Data management

All data for the meta-analysis were extracted independently by at least two review authors (from ET, EC, AL, NJ, TN, KK). Differences of opinion were resolved by consensus after consultation with another review author. Additional information on trial methodology or actual original trial data was sought from the corresponding authors of trials in which the eligibility criteria were apparently met: when aspects of methodology were unclear, or where data were in a form unsuitable for meta-analysis. Reminder correspondence was sent if a reply was not received within four weeks, and again at the time of updating the review.

Assessment of risk of bias in included studies

See Characteristics of included studies; Figure 1; Figure 2

Included studies were assessed independently by three review authors (ET, AL, KK) for the following quality criteria and methodological details. This information is presented in a table describing the included studies and provides the context for assessing the reliability of results.

Figure 1. Methodological quality summary: review authors' judgements about each methodological quality item for each included study.

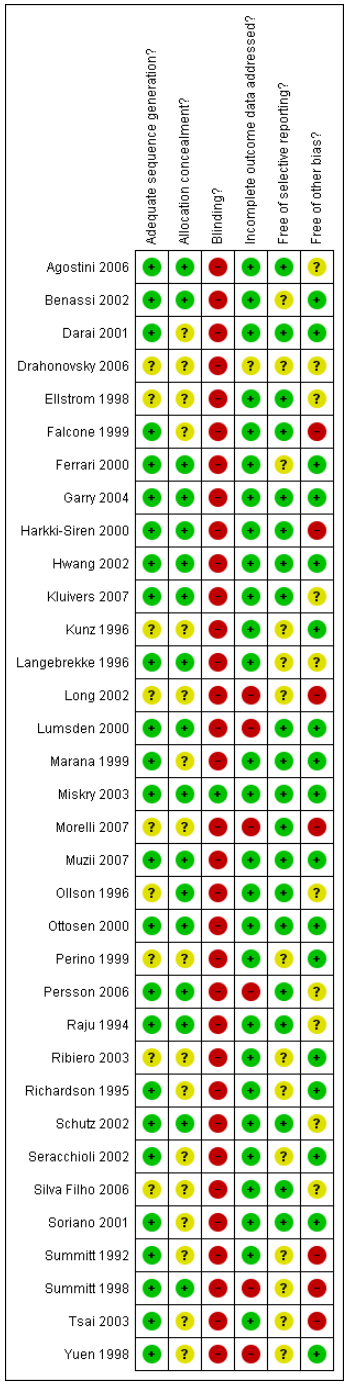
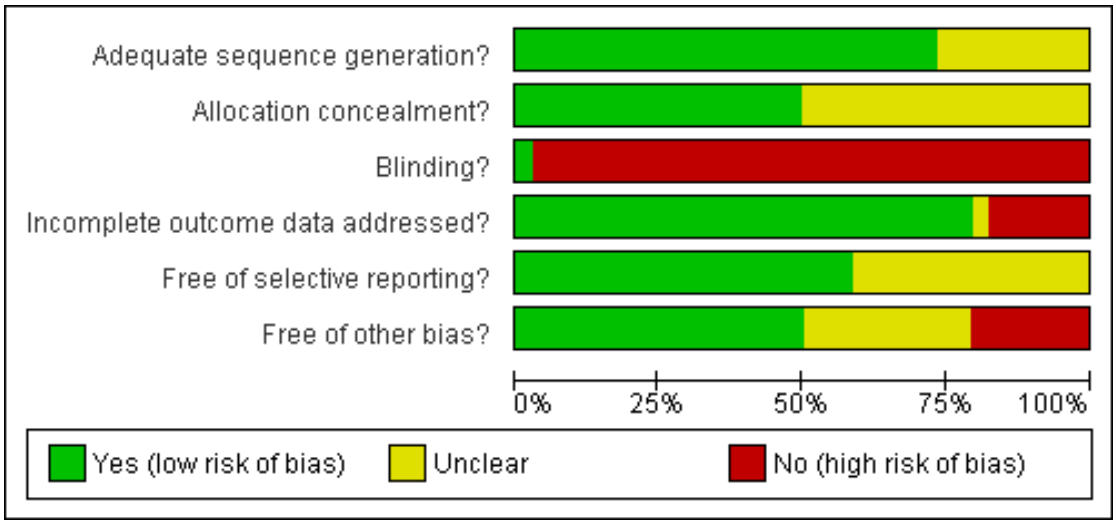


Figure 2. Methodological quality graph: review authors' judgements about each methodological quality item presented as percentages across all included studies.



The risk of bias table summarises the data on the randomisation and allocation process, blinding, strategy in the case of dropouts, pre-definition of outcome measures, and eventual obvious methodological problems of the included studies. In the table, 'Yes' represents a judgement of good quality, 'Unclear' denotes that the issue was not reported (or in case of allocation by sealed opaque envelopes could not be judged), and 'No' represents a risk of bias. For an adequate sequence generation, the sequence of randomisation had to be generated beyond the influence of the researchers. For adequate allocation concealment, the sequence of randomisation had to be unknown to the researcher until after the randomisation. Sealed opaque envelopes were judged as 'Unclear'. Since blinding of the surgeon was impossible in hysterectomy techniques, blinding was judged as 'Yes' in the case of an adequate attempt to blind the patient. For a judgement 'Yes' with regard to incomplete data, dropouts had to be included in the data analysis wherever possible. A study was judged as free of selective reporting where the outcome measures were obviously pre-defined, that is the primary outcome was defined or a sample size calculation had been performed for one of the outcome measures. Data on differences in the experience of surgical teams for different procedures and funding from pharmaceutical or surgical instrumentation companies were collected to assess other possible sources of bias.

Measures of treatment effect

Statistical analysis was performed in accordance with the guidelines from the Cochrane Handbook for Systematic Reviews of Interventions (Higgins 2008). The data were analysed using an intention-to-treat model, where data were available.

Dichotomous data were expressed as odds ratios with 95% confidence intervals and combined for meta-analysis with RevMan software using the Peto-modified Mantel-Haenszel method. An increase in the odds of a particular outcome is displayed graphically in the meta-analyses to the right of the centre line, and a decrease in the odds of an outcome is displayed graphically to the left of the centre line.

Continuous data were combined for meta-analysis with RevMan software using the mean difference (MD) with 95% confidence interval (CI). The mean and standard deviation (SD) were used when available or calculated from 95% CIs. When only the median and (interquartile) ranges were reported, or when measures of variation were missing, these results were presented as descriptive data in a separate table. Outcome variables that were reported only graphically were not included in the study.

Statistical heterogeneity between the results of different studies was examined by inspecting the scatter in the data points on the graphs, the overlap in their CI and, more formally, by checking the results of Chi^2 tests and I^2 statistics. The outcomes were pooled statistically where no clinical heterogeneity was apparent. A fixed-effect

model was used where statistical heterogeneity was absent. Where statistical heterogeneity was apparent after pooling of data, this was noted and statistically significant results interpreted cautiously after further analysis using a random-effects statistical model.

Dealing with missing data

The included studies were assessed for number of women lost to follow up and exclusions from analysis after randomisation (drop-outs).
Missing variables were not imputed for meta-analysis.

Assessment of heterogeneity

Where statistical heterogeneity was apparent after pooling of data, this was noted and statistically significant results were interpreted cautiously after further analysis using a random-effects statistical model.

Assessment of reporting biases

The included studies were assessed for pre-defined primary outcome measures or a power calculation, or both, to assess reporting bias.

Data synthesis

A fixed-effect model was used to calculate a pooled estimate of effect in meta-analyses. If significant statistical heterogeneity was confirmed by the Chi^2 test ($P < 0.1$) and the I^2 statistic ($I^2 > 50\%$) it was planned to use a random-effects model.

Sensitivity analysis

A sensitivity analyses was performed to examine the stability of the results in relation to the following factors.

- Exclusion of trials that were judged as 'unclear' or 'no' with regard to adequate sequence generation in the risk of bias table.
- Exclusion of trials comparing a surgical approach performed by one surgeon (or group of surgeons) with another surgical approach performed by a second (group of) surgeon(s).
- The effect of analysing studies of LH subcategories compared to studies of LH pooled as an overall category.

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies; Characteristics of ongoing studies.

Fifty-five trials were identified. Nine of these were initially identified as published abstracts from conference proceedings. The first authors of these studies were contacted in an attempt to obtain details that were not reported; two studies were included (Darai 2001; Miskry 2003) and two excluded (Møller 2001; Park 2003). Five studies that had been listed as 'Studies awaiting assessment' in the first publication of the review have been excluded in the present update. Either no replies from the authors were received to our repeated request for more information (Davies 1998; Pabuccu 1996; Petrucco 1999) or the women had already been included in another study (Cucinella 2000; Hahlin 1994). Fourteen further studies were excluded from the review; the reasons for their exclusion are listed in the 'Characteristics of excluded studies' table. The authors were able to extract data from the remaining 34 trials of which: three compared VH versus AH (Benassi 2002; Miskry 2003; Silva Filho 2006); 19 compared LH versus AH (including one LH-BSO versus AH-BSO (Raju 1994) and one LAVH versus minilaparotomy AH (Muzii 2007)); six compared LH versus VH (Agostini 2006; Darai 2001; Morelli 2007; Richardson 1995; Soriano 2001; Summitt 1992); two compared LAVH versus TLH (Drahonovsky 2006; Long 2002); one compared both LH versus AH and LH versus VH (Garry 2004); and three compared LH versus AH versus VH (Hwang 2002; Ottosen 2000; Ribiero 2003). Two studies have been described in two papers each. Where Ollson 1996 is mentioned in the review, the data from Ellstrom 1998b have been used where applicable. The eVALuate trial population was studied in two papers (Garry 2004; Sculpher 2004) and study quality was summarised under Garry 2004.

Study design

All of the included trials had a parallel-group design. Twenty-five of the trials were single-centre studies (five from Italy; three from Sweden; three from Taiwan; two each from the UK, USA, Brazil, France, and Germany; and one each from the Czech Republic, Finland, the Netherlands, and Hong Kong). Of the nine multicentre trials, three trials recruited from two centres (Darai 2001 based in France; Langebrekke 1996 based in Norway; Miskry 2003 based in the UK). Three trials recruited from three centres (Summitt 1998 based in the USA; Lumsden 2000 based in the UK; Muzii 2007 based in Italy). One trial from Italy (Marana 1999) recruited from four centres; one Swedish trial recruited from five centres (Persson 2006); and a trial based in the UK with additional centres in South Africa (Garry 2004) recruited from 30 centres.

Participants

The 34 included studies involved 4495 women, the majority in the age range 41 to 50 years.
All of the included studies recruited women who needed a hysterectomy for benign causes; six studies specifically included women who underwent hysterectomy for symptomatic uterine fibroids (Benassi 2002; Ferrari 2000; Hwang 2002; Long 2002; Ribiero 2003; Tsai 2003).

VH versus AH

Benassi 2002 specifically included women with symptomatic en-

larged fibroid uteri and excluded women with prolapse, vaginal stenosis, neoplasia, previous pelvic surgery, and taking hormone treatments within the six months prior to surgery. Miskry 2003 excluded women with uterine size greater than 14-weeks gestation, malignancy, adnexal pathology, reduced uterine mobility, or reduced vaginal access, and any woman requiring concomitant prolapse or incontinence surgery. Silva Filho 2006 included women with myoma and uterine size < 300 cm^3 and excluded women with uterine prolapse, need for associated procedures, and suspicion of extra-uterine disease.

LH versus AH (including LH-BSO versus AH-BSO, and LAVH versus minilaparotomy-AH)

Thirteen of the 23 studies that compared LH with AH specifically included women who were scheduled for an abdominal hysterectomy or who had contraindications for a vaginal hysterectomy (Ellstrom 1998; Harkki-Siren 2000; Falcone 1999; Ferrari 2000; Kluivers 2007; Lumsden 2000; Marana 1999; Muzii 2007; Ollson 1996; Seracchioli 2002; Summitt 1998; Tsai 2003; Yuen 1998). Contraindications to vaginal hysterectomy included: the size of the uterus greater than 12-weeks pregnancy (Kluivers 2007), greater than 14-weeks pregnancy (Lumsden 2000; Seracchioli 2002); uterine volume greater than 200 ml (Ferrari 2000), greater than 300 gm (Seracchioli 2002), greater than 280 gm (Marana 1999) or 200 gm (Schutz 2002); limited vaginal access (Ferrari 2000; Kluivers 2007; Marana 1999; Muzii 2007); lack of uterine descent (Kluivers 2007; Marana 1999; Muzii 2007) or immobile uteri (Ferrari 2000); previous pelvic surgery or a history of pelvic inflammatory disease (Ferrari 2000; Marana 1999; Muzii 2007); presence of moderate or severe endometriosis or adnexal disease, or both (Muzii 2007).

Thirteen studies excluded women according to their uterine size or width: uterine size greater than 12-weeks pregnancy (Langebrekke 1996), greater than 14-weeks pregnancy (Harkki-Siren 2000; Lumsden 2000; Perino 1999; Raju 1994), greater than 16-weeks pregnancy (Marana 1999; Tsai 2003; Yuen 1998), and greater than 18-weeks pregnancy (Kluivers 2007; Summitt 1998). Ellstrom 1998 and Ollson 1996 excluded women with a uterus width greater than 11 cm, whilst Harkki-Siren 2000 excluded women if the uterine width was greater than 10 cm.

women were excluded for various physiological and anatomical reasons: pubic arch of at least 90 degrees (Summitt 1998), uterine prolapse (Harkki-Siren 2000; Raju 1994; Seracchioli 2002), pelvic floor relaxation (Seracchioli 2002), and immobile uteri (Ferrari 2000). Medical reasons were: morbidly obese (Harkki-Siren 2000; Raju 1994), suspicious adnexal mass or malignant disease (Falcone 1999; Marana 1999; Langebrekke 1996; Persson 2006; Seracchioli 2002; Summitt 1998), severe pelvic disease including adhesions and endometriosis (Ferrari 2000; Harkki-Siren 2000; Ollson 1996; Summitt 1998), concomitant incontinence procedure, pelvic reconstruction or colporrhaphy required (Falcone 1999; Kluivers 2007; Summitt 1998), or if the women had any serious diseases including cardiopulmonary disease, bleeding disorders, psychiatric disorders (Harkki-Siren 2000; Langebrekke 1996; Persson 2006; Seracchioli 2002; Summitt 1998) or an absolute contraindication to laparoscopy (Muzii 2007).

LH versus VH

Three of the six studies that compared LH with VH included women if their uterine size was larger than 280 gm (Darai 2001; Soriano 2001) or below the midpoint between the pubis and umbilicus (Agostini 2006). The remaining three studies excluded women if their uterine size was greater than 12-weeks (Morelli 2007) or 16-weeks pregnancy (Richardson 1995; Summitt 1992). Exclusions for physiological and anatomical reasons were: pubic arch of at least 90 degrees (Summitt 1992), narrow vagina (Darai 2001), and immobile uteri (Darai 2001; Summitt 1992). Medical reasons were: suspicious adnexal mass or malignant disease (Agostini 2006; Darai 2001; Morelli 2007; Richardson 1995; Soriano 2001), severe pelvic disease including adhesions and endometriosis (Richardson 1995; Soriano 2001), concomitant incontinence procedure, pelvic reconstruction or colporrhaphy required (Morelli 2007; Summitt 1992), or if the women had any serious diseases including cardiopulmonary disease, bleeding disorders (Agostini 2006; Morelli 2007; Summitt 1992). Agostini 2006 excluded patients who refused bilateral oophorectomy or vaginal surgery and virgin patients.

VH versus LH (vLH as it was called in the trial) and AH versus LH (aLH as it was called in the trial)

Garry 2004 included women scheduled for hysterectomy for non-malignant conditions. The same exclusion criteria were used for both arms of the trial: a uterine mass greater than the size of 12-weeks pregnancy, suspected malignant disease of the genital tract, uterine prolapse, serious medical illness precluding surgery, and requirement for bladder or other pelvic support surgery.

LH versus AH versus VH

Two of the three trials (Hwang 2002; Ribiero 2003) specifically included women with uterine fibroids. Ottosen 2000 included women with leiomyomas <15 cm in diameter; Hwang 2002 included women with a myoma diameter larger than 8 cm and the second myoma less than 5 cm, or two myomata both at least 6 cm in diameter but less than 8 cm (a maximum of three myomata); Ribiero 2003 included women with fibroids or adenomyosis. Ottosen 2000 excluded those with a uterine mass larger than 16-weeks gestational size, previous dense adhesions, narrow vagina, or inaccessible uterus. Hwang 2002 excluded those with indications of adenomyosis, uterine prolapse, chronic pelvic pain, dysfunctional uterine bleeding, cervical dysplasia or pelvic inflammatory disease (PID). Ribiero 2003 excluded women: with uterine volume greater than 400 ml; taking anti-inflammatory drugs; with diabetes mellitus, coagulation disorders, and autoimmune disease.

LAVH versus TLH

Drahonovsky 2006 included women with benign uterine disease and excluded women in whom: laparoscopy was contraindicated,

there was suspicion of malignancy, the uterine size was beyond the 3rd month of gestation at clinical examination or more then 120 x 80 x 80 mm at ultrasound scan, there was a necessity of an accessory surgical procedure, or urinary incontinence or prolapse stage was beyond 1st degree.

In Long 2002, women were included if they had contraindications for vaginal hysterectomy (a uterine weight >280 gm, previous pelvic surgery, PID, need for adnexectomy, lack of uterine descent, and limited vaginal access). If their uterine volume was greater than 16-weeks pregnancy (or weight greater than 700 gm) they were excluded.

(Note that according to Condous 2007, a uterus of 12-weeks gestation corresponds to a uterus of approximately 220 gm.)

Interventions

Surgical procedures

VH versus AH

Four trials compared VH with AH (Benassi 2002; Miskry 2003; Ottosen 2000; Silva Filho 2006); one included a laparoscopic arm as well (Ottosen 2000). Hysterectomies were performed by standard technique for each route.

LH versus AH

Twenty-three trials included a comparison of laparoscopic hysterectomy (LH) with abdominal hysterectomy (AH). These included four trials that randomised women to LH, AH, and VH (Garry 2004; Hwang 2002; Ottosen 2000; Ribiero 2003). Raju 1994 compared LH and bilateral salpingo-oophorectomy (LH-BSO) with AH-BSO. Ellstrom 1998 stratified the two randomised groups (LH and AH) into total and subtotal hysterectomies. Muzii 2007 performed minilaparotomy for AH (with a moving surgical field or window and three separate retractors).

LH versus VH

Ten trials included a comparison of laparoscopic hysterectomy (LH) with vaginal hysterectomy (VH), including the four trials randomising women to LH, AH, and VH. Garry 2004 was a very large RCT comparing LH (called vLH in the trial) with VH and LH (called aLH in the trial) with AH; it was essentially two concurrent RCTs as part of the same study.

LAVH versus TLH

Drahonovsky 2006 and Long 2002 compared two types of laparoscopic hysterectomy, which was LAVH versus TLH in both studies.

Although all the trials used variations of the terms 'laparoscopic assisted vaginal hysterectomy' (LAVH) or 'laparoscopic hysterectomy', their definition varied according to what stages of the hysterectomy were completed laparoscopically and the point at which the operation continued vaginally. We included all trials with hysterectomies that had some laparoscopic component in the larger LH category. Using the Richardson 1995 'Staging of laparoscopic hysterectomy' table (see Additional Table 2) we were able to categorise 26 of the 29 included studies that involved LH according to the amount of laparoscopic content. We also subcategorised these 22 trials involving LH as either LAVH, LH(a), or TLH, depending on the extent of the surgery performed either laparoscopically or vaginally (see Additional Table 1). If any trial included women undergoing different Richardson LH stages in the LH arm, we arbitrarily categorised the stage firstly, as the stage to which the surgeons had intended to go; secondly, if that information was not available, to the LH stage that most women underwent surgery; or thirdly, the most advanced LH stage that women underwent. According to Richardson staging, one trial involved stage zero LH (Ottosen 2000), four trials were stage two (Agostini 2006; Kunz 1996; Marana 1999; Raju 1994), three trials were stage three (Ferrari 2000; Muzii 2007; Tsai 2003), nine trials were stage four where the uterine artery was transected laparoscopically (Darai 2001; Ellstrom 1998; Ollson 1996; Persson 2006; Schutz 2002; Soriano 2001; Summitt 1992; Summitt 1998; Yuen 1998), and nine trials were stage five (Falcone 1999; Hwang 2002; Harkki-Siren 2000; Kluivers 2007; Langebrekke 1996; Morelli 2007; Perino 1999; Ribiero 2003; Seracchioli 2002). For three trials we were unable to sub categorise the LH procedures and we described these as 'non-categorisable LH': Richardson 1995 had LHs of all stages from 0 to 5, and two trials (Garry 2004; Lumsden 2000) did not stipulate the LH stages performed. In Long 2002 the LAVH treatment arm was a stage three whilst the TLH arm was a stage five. Drahonovsky 2006 did not provide information on the LAVH and TLH procedures.

Antibiotic prophylaxis and anticoagulant therapy

In 24 of the trials the use of antibiotic prophylaxis was reported. Twenty-one trials prescribed the following antibiotics pre-operatively only (intravenous unless otherwise stated): cefazoline 2 gm (Darai 2001; Soriano 2001; Summitt 1992; Summitt 1998); cephalosporine 2 gm (Kunz 1996; Langebrekke 1996); metronidazole 500 mg (Harkki-Siren 2000); cephalosporine and metronidazole (Ellstrom 1998; Ollson 1996; Richardson 1995); cefuroxime 1.5 gm and metronidazole 1 gm rectally (Ottosen 2000); cefuroxime 1.5 gm and metrinodazole 1g (Persson 2006); cefotaxime 2 gm (Benassi 2002); co-amoxiclav 1.2 gm (Miskry 2003); ampicillin 2 gm (Seracchioli 2002); piperacillin 2 gm (Lumsden 2000); cefoxitin (Agostini 2006); cefoxitin 1.5 g (Drahonovsky 2006); amoxicillin clavulanate 2.2 gm (Kluivers 2007); cefalotin 1 gm (Silva Filho 2006); and first or second-generation cephalosporin (Muzii 2007).

Long 2002 prescribed intravenous cefazolin 1 gm pre and postoperatively. Raju 1994 gave Amoxil clavulanate (Augmentin) by bolus intravenous injection during and for seven days following the operation. Hwang 2002 prescribed cephalosporin 1 g every 8 hours combined with aminoglycoside 80 mg every 12 hours for one day after surgery.

In Ollson 1996, antibiotics were used in the laparoscopic arm of the study but they were not routinely given for the abdominal hysterectomies.

The use of low molecular weight heparin was reported in nine trials: three trials prescribed heparin pre-operatively (Benassi 2002;

Darai 2001; Soriano 2001) and six post-operatively (Drahonovsky 2006; Kluivers 2007; Langebrekke 1996; Miskry 2003; Ottosen 2000; Silva Filho 2006).

Anaesthesia and post-operative medication

Twenty-one trials specifically stated that all hysterectomies were completed under general anaesthesia (GA). In three trials, GA was used for all LHs but the choice of regional or general anaesthesia was left to the anaesthesiologists and patients for the AH or VH (Summitt 1992; Summitt 1998), or was not reported for AH (Muzii 2007). In Ottosen 2000, 109 of the 120 included women were operated on using GA, three had spinal blockade, and eight had spinal blockade in combination with epidural blockade. Benassi 2002 used GA for AH procedures and spinal anaesthetic for VH. Five trials did not report the anaesthetic technique used. Silva Filho 2006 described epidural anaesthesia for all VH and AH procedures.

Fifteen trials reported on the type of post-operative pain relief given to women. In six trials morphine was used, two via intramuscular morphine sulphate injections (Raju 1994; Soriano 2001), three via a programmable infusion pump (Ellstrom 1998; Falcone 1999; Yuen 1998), and in Ollson 1996 details of how the morphine was administered were not reported. In Hwang 2002 intravenous meperidine 50 mg was prescribed every four hours. Long 2002 administered lysine aspirin intravenously. Muzii 2007 prescribed ketorolac 30 mg once or twice daily and additionally on request on the operative and first post-operative days.

The use of oral or rectal analgesics was reported in 12 trials: Summitt 1992 and Summitt 1998 discharged women with 16 tablets of acetaminophenoxycodone; Raju 1994 gave rectal diclofenac immediately after surgery, followed by coproxamol or codidramol; Ellstrom 1998 and Hwang 2002 prescribed paracetamol; Soriano 2001 gave 2 gm propacetamol and 100 mg ketoprofen, started 30 to 60 minutes before completion of the operation and then every six hours for 24 hours followed by acetaminophen (paracetamol); Falcone 1999 gave oxycodone 5 to 10 mg every 4 to 6 hours as needed, then 325 to 650 gm acetaminophen (paracetamol) every 4 to 6 hours as needed; Kunz 1996 and Drahonovsky 2006 prescribed tramadol hydrochloride (100 and 50 mg respectively); and Marana 1999 and Perino 1999 prescribed ketorolac every six hours for the first 24 hours. The use of anti-emetic drugs was reported in three trials (Ellstrom 1998; Summitt 1992; Summitt 1998).

Risk of bias in included studies

An overview of the risk of bias is provided in Figure 1 and Figure 2. Only one study fulfilled all criteria for adequate management of risk of bias (Garry 2004). The two studies on two different laparoscopic hysterectomy techniques has a high risk of bias (Drahonovsky 2006; Long 2002).

Allocation

Randomisation and allocation concealment

Eight studies randomised by computer and used sealed opaque envelopes for allocation concealment (Agostini 2006; Ferrari 2000; Hwang 2002; Miskry 2003; Muzii 2007; Ottosen 2000; Raju 1994; Summitt 1998). Two trials randomised by computer and used a telephone for allocation concealment (Garry 2004; Schutz 2002). Langebrekke 1996 used a table of random digits for randomisation and used sealed opaque envelopes for allocation of concealment. Ten trials used a computer-generated randomisation code (Benassi 2002; Darai 2001; Falcone 1999; Lumsden 2000; Marana 1999; Seracchioli 2002; Soriano 2001; Summitt 1992; Tsai 2003; Yuen 1998) and one trial used a random numbers table (Richardson 1995) but none of these latter 11 trials reported whether allocation was concealed. Four trials used sealed opaque envelopes for allocation of treatment. Persson 2006 numbered the envelopes according to a random list, and Kluivers 2007 sealed the envelopes after which they were shuffled and numbered by a third party. The other two trials did not report the randomisation method (Harkki-Siren 2000; Ollson 1996). Seven trials did not report the randomisation method or if it was concealed (Drahonovsky 2006; Ellstrom 1998; Kunz 1996; Long 2002; Morelli 2007; Perino 1999; Ribiero 2003). The methodological quality of the Long 2002 trial was as follows: women were randomised to treatment groups before a large number (66) of the women were excluded. Therefore, the women in each treatment group may not have been a true representation of the original randomised groups.

Blinding

One trial reported sham abdominal dressings until discharge from hospital in VH (Miskry 2003).

One trial reported blinding of the interviewer one month after surgery (Silva Filho 2006).

Incomplete outcome data

Dropouts

Twenty-five trials reported no dropouts. Nine trials reported dropouts, with the dropout rate ranging from 1.7% to 12%. Table 4 lists the trials that reported dropouts with the dropout circumstances. In six trials the dropouts were excluded from the data analysis (Long 2002; Lumsden 2000; Morelli 2007; Persson 2006; Summitt 1998; Yuen 1998) whereas the other three either included the data in the analysis where possible (Falcone 1999; Kluivers 2007) or performed a sensitivity analysis for the missing data (Garry 2004). Four trials had women withdraw pre-operatively: Falcone 1999 (4 out of 48), Garry 2004 (34 out of 1380), Morelli 2007 (20 out of 420), and Persson 2006 (1 out of 119). In the Lumsden 2000 study, seven women withdrew pre-operatively and case records were not available for three more. Two and one women

respectively refused their assigned procedure in the Summitt 1998 and Kluivers 2007 studies; in the Yuen 1998 study, four women declined their assigned operation and a further two women refused to participate post-operatively. In the Long 2002 trial, excluded post-randomisation were: three women undergoing conversion to laparotomy, seven with incomplete records, and three with combined procedures. A further 53 were excluded because they did not have indications of uterine fibroids or adenomyosis. In the Persson 2006 trial, five patients allocated to AH and one to LH withdrew after giving informed consent prior to the operation or withdrew in the post-operative period before the five-week follow up.

Table 4. Studies reporting dropouts

Trial	No. dropouts	Details
Falcone 1999	4 (1 LH; 3 AH)	Withdrew pre-operatively
Garry 2004	34 (23 LH (11 aLH; 12 vLH); 6 AH; 5 VH)	Withdrew pre-operatively
Long 2002	13	3 laparotomy conversions were excluded from analysis; 7 incomplete records; 3 combined procedures that were excluded post-randomisation
Kluivers 2007	1	Refused assignment procedure
Lumsden 2000	10	7 withdrew pre-operatively; 3 case records not available
Morelli 2007	20	Withdrew pre-operatively
Persson 2006	6	5 allocated to AH and 1 to LH withdrew after informed consent prior to the operation or withdrew in the postoperative period before the 5-week follow up
Summitt 1998	2	Refused assignment procedure
Yuen 1998	6	4 declined operation; 2 refused to participate post-operatively

Intention-to-treat

Twenty-five trials reported no dropouts. Of the nine RCTs reporting dropouts, three reported analysis by intention to treat (ITT), defined as all randomised women reported upon according to the group of randomised allocation (Falcone 1999; Garry 2004; Kluivers 2007). Six RCTs reporting dropouts did not report ITT analysis of all randomised women (Long 2002; Lumsden 2000; Morelli 2007; Persson 2006; Summitt 1998; Yuen 1998). One further trial that had no dropouts did not analyse by ITT but according to the treatment received, which was different to the assigned treatment in two cases: the operation was converted from LH to AH and these women were analysed in the AH group (Tsai 2003).

Selective reporting

In 15 studies it was not clear whether the outcome measures had been pre-defined since the primary outcome was not reported and no sample size had been performed. Another four studies did not report that a power calculation was performed for sample size.

Garry 2004 performed the largest trial (n = 1380) and used major complications for power calculation. The recruitment target was met in the LH versus AH arm but not in the LH versus VH arm.

Outcomes

All of the trials assessed the operation times and intra or post-operative complications. Lumsden 2000 and Garry 2004 split the complications into major and minor. The majority (27 trials) assessed blood loss or haemoglobin change. Ellstrom 1998 reported on the difference in erythrocyte volume fraction. Febrile morbidity was measured in 13 trials, pulmonary function in one trial (Ellstrom 1998), and 14 trials reported any operations that were converted to abdominal surgery (Darai 2001; Drahonovsky 2006; Garry 2004; Kluivers 2007; Marana 1999; Morelli 2007; Muzii 2007; Ottosen 2000; Persson 2006; Richardson 1995; Seracchioli 2002; Soriano 2001; Summitt 1992; Summitt 1998).

Post-operative pain was assessed in 16 trials, with Ellstrom 1998 listing it as a primary outcome. Thirty-one trials assessed the length of post-operative hospital stay and nine included an analysis of costs. Recovery time or the time needed to return to normal activities or work was assessed in 14 trials. An assessment of health status was reported in nine trials, three trials included sexual activity or body image in the analysis (Garry 2004; Long 2002; Morelli 2007).

Other potential sources of bias

Surgeon's experience

The surgeon's experience or level of training was reported in 20 of the trials. Eleven of the trials used the authors of the trial or surgeons of senior registrar grade to perform all the operations. Five of these trials specified that the same group of surgeons performed operations for both interventions (Benassi 2002; Hwang 2002; Lumsden 2000; Seracchioli 2002; Silva Filho 2006). In five trials, surgeons for one intervention were different to those performing the other intervention: Ollson 1996 (LH carried out by 2 out of 5 senior registrar grade surgeons trained in LH, AH carried out by 2 out of 10 senior registrar grade surgeons trained in AH); Langebrekke 1996 (LH performed exclusively by the two authors, AH performed by any skilled gynaecologist in the department); Raju 1994 (LAVH performed by one of the authors, AH by one of the authors or a senior registrar grade surgeon); Kluivers 2007 (LH was performed or supervised (resident 39%) by 3 out of 10 experienced gynaecologists (at least 100 LHs), AH performed or supervised by all 10 gynaecologists; and Long 2002 (one surgeon performed all LAVH, another performed all TLH). Residents were the first surgeon in 39% of LH and 88% of AH. In Agostini 2006 the five surgeons were experienced in vaginal surgery but laparoscopic experience was not reported. Drahonovsky 2006 reported that all surgeons of the department participated in the LAVH and TLH procedures. In Ottosen 200015 gynaecological surgeons with assistants performed the operations, their experience varied and there were cases of residents performing operations under supervision. In Schutz 2002 71% of LH were performed by the attending physician and 29% by a resident under supervision, and 40% of AH were performed by the attending physician and 60% by the resident under supervision. One trial (Summitt 1998) used only gynaecological residents to perform all the operations with the assistance of the attending physician. It is unlikely that any of the latter three trials used the same group of surgeons for both intervention groups. In three other trials it was unclear if the surgeons performing the operations were different: Darai 2001 (all experienced in laparoscopic and vaginal surgery but no mention of who performed each intervention); Perino 1999 (LH by team of three laparoscopic surgeons with experience of more than 100 LHs, no details provided for AH arm); and Falcone 1999 (one of the senior authors performed all the LH operations with the assistance of a pelvic surgery fellow or resident, but no mention of the AH group). In four of the trials, surgeons of all grades and experience carried out the operations. In Garry 2004 each surgeon recruited to the trial had to have performed 25 of each procedure, however cases could be used for teaching if the main assistant was the designated surgeon.

Source of funding

Twelve studies reported their sources of funding. Three of these studies received funding from pharmaceutical or surgical instrumentation companies: Falcone 1999 received part of the funding from Ethicon Endosurgery Inc; Harkki-Siren 2000 received a part of its funding from the Research Foundation of the Orion Corporation; Summitt 1998 received all of its funding from US Surgical Corporation, USA.

Effects of interventions

Meta-analysis results

Where outcomes for specific comparisons included in the meta-analysis are not mentioned below, no data were available from the included trials. For results that were not statistically significant, the summary statistics and CIs have not been reported in the text but can be found in the meta-analysis graphs.

Where there were differences in the subcategories (for example TLH) these have explicitly been reported. All other subcategory meta-analyses were similar to meta-analysis of the pooled groups.

Primary outcomes

Return to normal activities

VH versus AH

For VH versus AH, patients returned to normal activities sooner after VH (MD 9.5 days, 95% CI 6.4 to 12.6 days; 176 women, 3 trials, Analysis 1.1) although statistical heterogeneity was present

(Chi^2 P value 0.02, I^2 = 75.3%); similar results were obtained with a random-effects model.

LH versus AH

Return to normal activities was also quicker after LH than after AH (MD 13.6 days, 95% CI 11.8 to 15.4 days; 520 women, 6 trials, Analysis 2.1) although statistical heterogeneity was present (Chi^2 P value 0.004, I^2 = 71.2%); similar results were obtained with a random-effects model.

LH versus VH

For LH versus VH there was no difference in return to normal activities (140 women, 2 trials, Analysis 5.1).

Intra-operative visceral injury

VH versus AH

There were no statistically significant differences in bladder, ureter, or urinary tract injuries for the comparison VH versus AH (239 women, 3 trials, Analysis 1.4). No bowel or vascular injuries occurred in either group.

LH versus AH

Where bladder and ureter injuries were pooled as 'urinary tract injury', there was a significant increase in urinary tract injury for LH versus AH (OR 2.41, 95% CI 1.21 to 4.82; 2090 women, 12 trials, Analysis 2.5). There were no statistically significant differences in bladder, ureter, bowel, or vascular injuries for the comparison LH versus AH.

LH versus VH

There were no significant differences in urinary tract injuries between LH and VH (1205 women, 7 trials, Analysis 5.4). When regarding the LH subcategories, there were statistically significantly more urinary tract injuries for TLH versus VH (OR 3.69, 95% CI 1.11 to 12.24; 440 women, 2 trials, Analysis 6.4). There were no statistically significant differences in bladder, ureter, bowel, or vascular injuries for the comparison LH versus VH.

TLH versus LAVH

There were no statistically significant differences in bladder, ureter, urinary tract, or vascular injury for the comparison TLH versus LAVH (186 women, 2 trials, Analysis 7.1). No bowel injuries occurred in either group.

Major long-term complications

VH versus AH

No urinary dysfunction occurred in either group (80 women, 1 trial, Analysis 1.5).

LH versus AH

No significant differences were found in the following long-term complications: fistula formation (245 women, 2 trials, Analysis 2.6), and urinary dysfunction (246 women, 2 trials, Analysis 2.6).

LH versus VH

No significant differences were found in the following long-term complications: fistula formation (56 women, 1 trial, Analysis 5.5), and urinary dysfunction (80 women, 1 trial, Analysis 5.5).

TLH versus LAVH

No significant differences were found in the following long-term complication: sexual dysfunction (that is dyspareunia or failure to orgasm) (101 women, 1 trial, Analysis 7.2).

Secondary outcomes

Satisfaction and *q*uality of life

VH versus AH

For VH versus AH, Silva Filho 2006 found significantly better quality of life after VH in the SF-36 sub scales for functional capacity, physical aspects, and pain; and a higher rate of patients in VH who would choose the same treatment again. There were no significant differences in patient satisfaction between VH versus AH (Benassi 2002).

LH versus AH

For LH versus AH, Garry 2004 demonstrated that quality of life (measured by the SF12 scoring system) was significantly better for LH at six weeks; body image was significantly improved for LH versus AH at six weeks and four months, but not 12 months; and sexual frequency was significantly higher at six weeks following LH. Kluivers 2007 found a significant treatment effect favouring LH in the RAND-36 scale for vitality in the first 12 weeks post-operatively.

There were no significant differences in patient satisfaction between LH and AH (Lumsden 2000).

LH versus VH

Morelli 2007 found a significant higher score on the physical component score of SF-12 for LH versus VH at six weeks post-operatively.

Operation time

VH versus AH

Three trials in the meta-analysis of VH versus AH showed a significant difference, two in favour of VH (259 women, 3 trials, Analysis 1.6). Because the direction of the treatment effect differed amongst studies, the results were not pooled.

LH versus AH

AH had a significantly shorter operation time than LH (MD 11.8 minutes, 95% CI 8.6 to 14.9 minutes; 1047 women, 11 trials, Analysis 2.7). In the subcategory of trials where LAVH was compared with AH, one trial showed a significantly shorter operation time in LAVH (Tsai 2003), whilst other subcategories of LH took significantly longer than AH operations (LH(a) versus AH: MD 30.6 minutes, 95% CI 25.6 to 35.7 minutes; 420 women, 5 trials, Analysis 2.7; TLH versus AH: MD 22.7 minutes, 95% CI 14.6 to 30.8 minutes; 161 women, 2 trials, Analysis 2.7).

LH versus VH

VH had a significantly shorter operation time than LH (MD 39.3 minutes, 95% CI 38.7 to 39.9 minutes; 741 women, 6 trials,

Analysis 5.6) and, although statistical heterogeneity was present (Chi^2 P value 0.0005, I^2 = 77 %), similar results were obtained with a random-effects model.

TLH versus LAVH

LAVH had a significantly shorter operation time than TLH (MD 23.3 minutes, 95% CI 10.0 to 40.6; 101 women, 1 trial, Analysis 7.3).

Intra-operative complications (other than visceral injury)

VH versus AH

No significant differences in mean blood loss were found between VH and AH (140 women, 2 trials, Analysis 1.8).

LH versus AH

No significant differences were found in the number of women with substantial bleeding between LH and AH (1266 women, 5 trials, Analysis 2.5). For the subcategories, LH(a) was associated with significantly fewer blood transfusions than AH (OR 0.50, 95% CI 0.26 to 0.95; 641 women, 8 trials, Analysis 3.11).

LH versus VH

Substantial bleeding was higher for LH versus VH (OR 2.76, 95% CI 1.02 to 7.42; 904 women, 2 trials, Analysis 5.4). There were no differences in the number of unintended laparotomies (1290 women, 8 trials, Analysis 5.4).

TLH versus LAVH

There were no differences in number of unintended laparotomies (189 women, 2 trials, Analysis 7.1).

Short-term outcomes and complications

VH versus AH

Hospital stay was significantly shorter in VH compared to AH (MD 1.1 day, 95% CI 0.9 to 1.2 days; 295 women, 4 trials, Analysis 1.13) although statistical heterogeneity was present (Chi^2 P value < 0.00001, I^2 = 95.0%); similar results were obtained for these outcomes using a random-effects model). For VH versus AH, there were significantly fewer febrile episodes or unspecified infections in VH (OR 0.42, 95% CI 0.21 to 0.83; 295 women, 4 trials, Analysis 1.10). There were no significant differences in the need for blood transfusion, mean blood loss, haemoglobin drop, occurrence of pelvic haematoma, or vaginal cuff infection, UTI and chest infection for VH versus AH.

LH versus AH

Hospital stay was significantly shorter in LH compared to AH (hospital stay MD 2.0 days, 95% CI 1.9 to 2.2 days; 1007 women, 10 trials, Analysis 2.14) although statistical heterogeneity was present (Chi^2 P value < 0.00001, I^2 = 95.0%); similar results were obtained for these outcomes using a random-effects model. For LH versus AH, there were significantly fewer wound or abdominal wall infections in LH (OR 0.31, 95% CI 0.12 to 0.77; 530 women, 6 trials, Analysis 2.12) and significantly fewer febrile episodes or unspecified infections (OR 0.67, 95% CI 0.51 to 0.88; 2138 women, 15 trials, Analysis 2.12). Although LH and AH showed no significant difference in the need for blood transfusion, LH was associated with a significantly lower mean blood loss (MD 45.3 ml, 95% CI 17.9 to 72.7 ml; 693 women, 7 trials, Analysis 2.9) and smaller drop in haemoglobin (MD 0.55 g/L, 95% CI 0.28 to 0.82 gm/L; 288 women, 3 trials, Analysis 2.10). There were no significant differences in the occurrence of pelvic haematoma, vaginal cuff infection, UTI, or chest infection, and thromboembolic events.

LH versus VH

There were no significant differences in hospital stay for LH versus VH (685 women, 5 trials, Analysis 5.12). For LH versus VH, there was a significantly higher need for blood transfusion in LH (OR 2.07, 95 % CI 1.12 to 3.81; 1249 women, 7 trials, Analysis 5.10). There were no significant differences in the occurrence of pelvic haematoma, vaginal cuff infection, UTI, chest infection, febrile episodes or unspecified infection, and thromboembolic events.

TLH versus LAVH

There were no significant differences in hospital stay for TLH versus LAVH (101 women, 1 trial, Analysis 7.8). For TLH versus LAVH, there were significantly more febrile episodes or unspecified infections in TLH (OR 3.77, 95% CI 1.05 to 13.51; 186 women, 2 trials, Analysis 7.6). There were no significant differences in the need for blood transfusion, mean blood loss, and haemoglobin drop for TLH versus LAVH. There were no significant differences in occurrence of pelvic haematoma or vaginal cuff infection for TLH versus LAVH.

Sensitivity analyses

Exclusion of trials susceptible to inadequate sequence generation during the randomisation process

Exclusion of nine trials with unclear or detrimental sequence generation (Drahonovsky 2006, Ellstrom 1998; Kunz 1996; Long 2002; Morelli 2007; Ollson 1996; Perino 1999; Ribiero 2003; Silva Filho 2006) altered the results as follows: bleeding and transfusion in LH versus VH were no longer significantly different; and estimated blood loss, transfusion, and drop in haemoglobin in LH(a) versus AH were no longer significantly different.

Exclusion of trials susceptible to 'surgeon effect'

Exclusion of the four trials in which surgeons for one intervention were unequivocally different to those performing the other intervention (Kluivers 2007; Langebrekke 1996; Ollson 1996; Raju 1994) did not alter the statistical significance of any meta-analysis results.

Data from included trials that were not in the meta-analysis

Only outcomes reaching statistical significance will be mentioned below (a full summary of results is presented in Data and analyses: Tables 01 to 08).

Primary outcomes

Return to normal activities

LH versus AH

Median duration of return to normal activities was significantly shorter for LH in three trials (Langebrekke 1996; Persson 2006; Raju 1994).

Secondary outcomes

Operation time

VH versus AH

Hwang 2002 found a significantly shorter median operating time for VH (74 minutes) versus AH (98 minutes).

LH versus AH

In five trials, AH had a significantly shorter median operation time than LH (Falcone 1999 (P < 0.001); Ferrari 2000 (P = 0.001); Muzii 2007; Persson 2006 (P < 0.0001); Raju 1994 (P < 0.0001)). In Drahonovsky 2006, median operating time was significantly shorter for LAVH (85 minutes) versus TLH (111 minutes) (P < 0.001).

LH versus VH

Hwang 2002 found a significantly shorter median operating time for VH (74 minutes) versus LH (109 minutes).

Intraoperative complications

LH versus AH

For LH versus AH, median estimated operative blood loss was significantly lower for AH in one trial (Falcone 1999), and for LH in two trials (Kluivers 2007; Yuen 1998). Median haemoglobin drop was significantly lower for LH versus AH in one trial (Schutz 2002).

LH versus VH

For LH versus VH, significantly more women experienced blood loss > 500 cc (Agostini 2006).

TLH versus LAVH

Drahonovsky 2006 found less blood loss for TLH versus LAVH.

Short term outcomes

VH versus AH

Benassi 2002 found a significant lower percentage of patients demanding analgesics after VH.

LH versus AH

For LH versus AH, LH was associated with significantly lower pain scores in a number of trials: on post-operative days 0, 1, 2 and 3 (Marana 1999), day 1 and 2 (Muzii 2007), day 2 (Ollson 1996), day 4 (Schutz 2002); and on coughing (Ellstrom 1998). TLH was associated with significantly less severe post-operative pain than AH (Perino 1999). Recovery from pain was significantly faster for LH (Raju 1994). Concerning analgesic use, LH was associated with: significantly less opiate use (Garry 2004; Kluivers 2007) and oral and rectal analgesia (Langebrekke 1996); shorter duration of analgesic use overall (Raju 1994) and of patient-controlled analgesic use (Falcone 1999); fewer patients requiring intramuscular narcotics on the day of surgery (Summitt 1998); and less analgesic use after the first 24 hours (Ferrari 2000). Median duration of hospital stay was significantly shorter for LH in six trials (Falcone 1999; Ferrari 2000; Langebrekke 1996; Persson 2006; Raju 1994; Yuen 1998).

LH versus VH

For LH versus VH, Morelli 2007 found significantly lower pain scores on day zero for LH. In Summitt 1992, LH was associated with significantly greater use of oral pain tablets on post-operative day two.

TLH versus LAVH

For TLH versus LAVH, TLH was associated with significantly greater use of tramadol during hospitalisation (Drahonovsky 2006).

Cost

LH versus AH

No trial found a significant difference in the overall cost of LH versus AH, but only five RCTs examined comparative cost in any detail (Ellstrom 1998; Falcone 1999; Lumsden 2000; Raju 1994; Summitt 1998).

LH versus VH

The mean total hospital cost was significantly higher for LH than for VH (Summitt 1992).

DISCUSSION

Summary of main results

Our review found a number of statistically significant advantages of VH over AH. VH was associated with quicker return to normal activities, earlier discharge from hospital, and VH was less painful. There were conflicting data on which was the quickest operation to perform and this presumably relates to the prior experience with these procedures of the surgeons involved in the trials. LH offered a number of statistically significant advantages over AH. These were quicker return to normal activities, less post-operative pain, fewer wound or abdominal wall infections, fewer febrile episodes or unspecified infections, smaller drop in haemoglobin, earlier discharge from hospital, and improved quality of life at six weeks and four months after surgery; the cost was more urinary tract injuries and longer operating time. LH had a number of statistically significant disadvantages compared to VH. These were longer operating time, higher rate of substantial bleeding, greater use of oral pain tablets on day two, and a higher hospital cost. TLH was associated with statistically significantly more urinary tract injuries compared to VH. TLH was associated with signifi-

cantly more febrile episodes or unspecified infections and longer operation time compared to LAVH.

Speed of recovery is determined by the avoidance of an abdominal procedure; AH is associated with lengthier recovery than all other approaches to hysterectomy. Avoidance of AH appears to be important to minimise post-operative pain and to avoid abdominal wall infections and infections of unspecified origin or general apyrexial illness post-operatively.

Although regarded as very important, the quality of life data do not lend themselves easily to meta-analysis (due to the use of diverse tools, time frames, and statistical analysis). Data on quality of life can show the impact of surgery and complications on patient's lives, and thus can be a leading argument in the discussion about the best way to perform a hysterectomy (Kluivers 2008). Only a few studies in the meta-analysis have used quality of life as an outcome measure. The available data indicate that the laparoscopic and vaginal procedures performed better or equally compared with AH as far as the quality of life in the first weeks after the procedure was concerned. In the decision on an approach to hysterectomy, the advantage of better quality of life should be offset against disadvantages. Meta-analysis of quality of life data would benefit from the use of well validated instruments applied in a standardised manner in future studies (Kluivers 2008b; Kluivers 2008c).

Urinary tract damage, in particular ureteric injury, remains the major concern related to the laparoscopic approach (Garry 2004; Garry 1995; Harkki-Siren 1997). However, this meta-analysis of RCTs was underpowered to detect a clinically significant increase in the incidence of bladder and ureter damage from a laparoscopic approach. Much of the data for an increased incidence of urinary tract injury has come from non-randomised studies. Only large case series usually have the power to detect such a rare complication, but RCTs remain the least biased way to assess the benefits and harms of an intervention. When bladder and ureter injuries in our meta-analysis were pooled under a single category 'urinary tract injury', a significant increase in urinary tract injury was detected for LH versus AH (OR 2.4, 95% CI 1.2 to 4.8) and TLH versus VH (OR 3.7, 95% CI 1.1 to 12.2).

Operating time is overall longer for LH versus AH, and LH versus VH. However, LAVH had a significantly shorter operating time than TLH. This suggests that operating time seems to be governed by the proportion of the surgery performed laparoscopically and the greater proportion performed laparoscopically, the lengthier the operation.

Overall completeness and applicability of evidence

It is particularly difficult to address the issues surrounding effectiveness and complications in surgical procedures where the skill base of surgeons is not only variable but different between surgeon experience of 'traditional' operations and 'laparoscopic' operations. This is likely to be especially relevant to the rates at which complications, such as ureteric damage, occur. There is no good way of taking into account the risk of such rare complications in surgeons who are beyond their learning curve. This is not just a hysterectomy issue but pervades many aspects of surgical therapy and surgical innovations. It does not apply to the same extent where drug therapy interventions are being studied, in which the efficacy is much less dependent on the skill of the investigator providing the treatment. Much of the Cochrane methodology is developed based on the medical model of intervention.

Until the last few years, the vast majority of hysterectomies were performed abdominally (Reich 2003; Vessey 1992), although in some countries there is a tendency to perform fewer abdominal hysterectomies (Brummer 2008; Spilsbury 2006). In the current state of gynaecological practice and training, all training gynaecologists tend to become thoroughly trained in abdominal hysterectomy techniques but there is huge variation in their learning curve position in relation to vaginal and laparoscopic hysterectomy techniques.

In clinical practice as well as in the trials included in this review, VHs will be mostly performed under optimum conditions only, whereas AH remains the default intervention for all more difficult cases. Each gynaecologist (as has been the case since AH became the alternative to VH, in 1863) will have his or her own indications for the choice of approach to hysterectomy for benign disease. These choices may be influenced to some extent by the results from scientific evidence (for example this review) but the decisions will also be largely based on their own array of surgical skills and the patient characteristics. Whether there will be more of a consensus in the future than there has been to date, regarding these indications for route of hysterectomy, is less certain. To reach this consensus, however, should probably not be the ultimate goal since the prudent decision for one approach to hysterectomy over the other may be very justified and may lead to better outcomes after all.

One concern is the statistical heterogeneity of the trials included in this review. The heterogeneity in such outcomes as operating time, even when the 'traditional' hysterectomy techniques VH versus AH are compared, directly relates to the fact that some surgeons are better trained in and thus perform faster either type of hysterectomy. This heterogeneity might be expected to be even more apparent when LH is compared with either AH or VH. Concerning the heterogeneity in recovery time, hospital policies on post-operative stay and advice regarding when to resume work can differ, hence the observed differences.

Although much has been written in the scientific literature about various outcomes of hysterectomy, there has been no discussion on what outcomes are of key importance. Surgeons wish to minimise operative complications, healthcare managers wish to minimise costs, but what do patients want? Quality of life is likely to be the most key outcome as it captures the benefit the patient experiences from treatment and takes into account the effects of complications on women's lives (Chien 2005; Johnson 2005b; Kluivers 2008).

Consequently, the most plausible primary measure of effectiveness is 'return to normal activity' (where VH and LH fare most favourably). 'Major lasting problem' could be considered as the primary adverse event, but data on all long-term outcomes are sparse in these RCTs. Whether it is reasonable to prioritise outcomes as primary or secondary in advance is controversial. Usual Cochrane policy is to term the most clinically relevant outcome as 'primary' rather than the one most obviously affected by the treatments under comparison. There is certainly scope for the authors of individual RCTs to report only the outcomes that they consider to have produced interesting results, resulting in reporting bias. Each single complication is rare and thus a large sample size is needed to capture each one of them individually and powerfully. So researchers tend to pool complications together into composite outcomes, an approach that is not scientifically sound. More importantly, when comparing different types of hysterectomies laparotomy cannot be a complication of abdominal hysterectomy, leading to asymmetry of comparison.

There is currently a much larger database of trial experience involving LAVH than for TLH and this undermines the extent to which conclusions may be drawn about TLH currently.

One vital conclusion from our review must be that VH remains a very good option when it is feasible, since we have not shown any significant disadvantages of VH versus any other approach. In selected cases, even in patients without previous vaginal delivery, VH can be performed (Tohic 2008). The concept that LH allows identification of pelvic disease (such as adhesions and endometriosis) which could otherwise lead to complications with VH, and that the meticulous haemostasis achievable with 'final-look' laparoscopy during LH might reduce pelvic haematomas or vaginal cuff infections, have not been borne out in the outcomes in this review. It is uncertain whether the increased detection of unexpected pathology at LH versus VH (Garry 2004) affects subsequent clinical outcomes. Although it has been suggested that LAVH does little more than to combine the complications of laparoscopic surgery with those of vaginal surgery (Reich 2003), this has not been supported in our review. Where oophorectomy is desired, a laparoscopic approach may facilitate this.

Quality of the evidence

Most outcomes for the comparisons LH versus AH, as well as LH versus VH, are mainly based on the large trial by Garry 2004 with a low risk of bias.

With regard to the comparison VH versus AH, the conclusions are based on six trials with comparable sample sizes and low risk of bias.

There was a high risk of bias in the only two studies on different approaches to laparoscopic hysterectomy, and consequently the results and conclusions from this comparison need to be appreciated with caution.

The risk of bias table provides a quick overview of the trial quality variables. The distinction between 'good trial quality' and 'poor trial quality' is, however, still a quite controversial area with no clear guidelines. In this review, the distinction between good and poor trial quality has been made as based on the adequacy of allocation concealment. The sensitivity analysis has led to some changes in statistical significance in various variables on bleeding and blood loss. The findings with regard to complications, operation times, and recovery times did not change with exclusion of trials with more detrimental trial quality.

Potential biases in the review process

Three so called multi-arm trials have been included in the review (Hwang 2002; Ottosen 2000; Ribiero 2003) where data have been used twice in different comparisons. There is not an agreed approach to this problem. Since no large effects of correlation and non-independence of data are expected on the resulting conclusions, no special measures have been taken in the review to address this issue. Similar correlation between the two trials and interdependence of data might be present in the study by Garry 2004 where the surgeon, and not randomisation, made the decision in which trial a patient was included. Again, this is unlikely to have influenced the results of the review.

AUTHORS' CONCLUSIONS

Implications for practice

When technically feasible, VH should be performed in preference to AH because of more rapid recovery and fewer febrile episodes post-operatively. Where VH is not possible, LH has some advantages over AH (including less operative blood loss, more rapid recovery, fewer febrile episodes, and wound or abdominal wall infections) but these are offset by longer operating time and more urinary tract (bladder or ureter) injuries. No advantages of LH over VH could be found; LH had longer operation time and more substantial bleeding, and TLH had more urinary tract injuries. Of the three subcategories of LH, there are more RCT data for LAVH and LH(a) than for TLH. The surgical approach to hysterectomy should be decided by a woman in discussion with her surgeon in light of the relative benefits and hazards. These benefits and hazards seem dependant of surgical expertise and may influence the decision.

Implications for research

The various subcategories of LH should be further evaluated against each other. For example, whether TLH has any benefits or harms in comparison to other forms of LH (including LH(a) and LAVH). The increase in the rate of ureteric injury resulting from

LH, suggested by very large observational studies, remains to be conclusively proven by RCT data. In recent years, robot-assisted hysterectomy has come into practice, but RCTs are lacking, until now.

Although it is important that RCTs should have the same surgeon (or group of surgeons) carrying out each of the approaches being compared, different levels of expertise with each approach means that such RCTs are always likely to be statistically heterogeneous when considered for pooling in meta-analyses.

We strongly encourage trial authors to report their laparoscopic approach to hysterectomy according to our defined subcategories: LAVH, LH(a), TLH, and LSH (Table 1). This should minimise the confusion that has prevailed in the first published literature on LH.

There is an absence of data for long-term outcomes in RCTs comparing surgical approached to hysterectomy. RCTs should aim to report long-term outcomes, including urinary, bowel, and sexual function, along with occurrence of fistulae. Quality of life may be regarded as a key outcome in trials on the approaches to hysterectomy for benign disease. To enable meta-analysis of quality of life data, well validated instruments should be applied in a standardised manner.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Agostini 2006

Methods	Duration: April 2002 - February 2004 (1 year, 10 months). Randomisation: numbered sealed opaque envelopes based on a computer-generated allocation list. Single centre study, parallel group design with no blinding. Number of women eligible and randomised = 48. There were no dropouts or conversions. Power calculation was performed for sample size. 24 patients per group were necessary to detect a difference in complications between the 2 groups of 35% or more (25% versus 60% in VHO and LAVHO respectively) with 80% power with a significance level of 0.05. Analysis was by intention to treat (no conversions).
Participants	48 women with a mean age of 55 years in the VHO group and 53 years in the LAVHO group. Inclusion criteria: women with benign disease, older than 45 years, uterine size below halfway pubis and umbilicus. Exclusion criteria: virgin patient, contraindication pneumoperitoneum, adnexal mass.
Interventions	VHO versus LAVHO. VHO: standard VH technique with removal of ovaries and tubes as described by Ballard, or an endo loop in case needed. LAVHO: laparoscopic dissection of suspensory ligaments and round ligaments, followed by vaginal hysterectomy. Laparoscopy at the end of the procedure. Both groups received prophylactic antibiotic treatment (Cefoxitin IV). GA for both VHO and LAVHO. Five different surgeons carried out both procedures. Surgeon experience: surgeons experienced in vaginal surgery. women were followed up until one months after surgery.
Outcomes	Primary outcome: complications (blood loss more than 500 mL, blood transfusion, haematoma, post-operative fever). Secondary outcomes: operative time; hospital stay.
Notes	France. University Hospital of Marseille. Funding not reported.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Computer-generated allocation list
Allocation concealment?	Yes	Numbered sealed opaque envelopes

Agostini 2006 (*Continued*)

Blinding? All outcomes	No	Blinding not reported.
Incomplete outcome data addressed? All outcomes	Yes	No dropouts, no losses to follow up
Free of selective reporting?	Yes	
Free of other bias?	Unclear	Surgeons experienced in vaginal surgery

Benassi 2002

Methods	Duration: June 1997 - December 2000 (2 years, 6 months). Randomisation: computer-selected randomisation. Single centre study, parallel group design with no blinding. Number of women randomised = 119. No dropouts reported. No power calculation reported.
Participants	119 women with a mean age of 47 years for the AH group and 48 years for the VH group. Inclusion criteria: women with symptomatic enlarged uteri (200-1300 ml). Exclusion criteria: prolapse, uterine or adnexal neoplasia, pelvic inflammation, vaginal stenosis, previous pelvic or vaginal procedures, hormonal treatment in the 6 months prior to surgery.
Interventions	AH versus VH. AH and VH performed according to Novak technique. Peri-menopausal patients also underwent bilateral oophorectomy. Both groups received prophylactic antibiotic treatment (cefotaxime 2 g IV) and anticoagulant therapy with enoxaparin 2000 IU. GA for AH; spinal anaesthetic for VH. The same surgeons carried out the surgery.
Outcomes	Operative time; operative complications (injury to major vessel, ureter, bladder and bowel); drop in haemoglobin; post-operative complications; hospital stay.
Notes	Italy. University Hospital of Parma. Funding not reported.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	Patients were randomly allocated
Allocation concealment?	Yes	Computer-selected randomisation

Benassi 2002 (*Continued*)

Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	no dropouts
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported
Free of other bias?	Yes	

Darai 2001

Methods	Duration: January - December 1999 (1 year). Randomisation: pre-determined computer generated randomisation code. Multicentre study (n=2), parallel group design with no blinding. Number of women randomised = 80. No dropouts reported. Three LAVH converted to AH. Power calculation to estimate sample size performed, 35 women required for each surgery arm (assuming that the incidence of complications in women who had LH(a) was 10% and there was an increase of complication rate to 40%), with an alpha (type I error) of 0.05 and a beta (type II error) of 0.2.
Participants	80 women with a mean age of 50 years for the LH(a) group and 49 years for the VH group. Inclusion criteria: women scheduled for abdominal hysterectomy for benign disease with traditional contraindications for VH, including uterine size larger than 280 g and one or more of the following: previous pelvic surgery, history of pelvic inflammatory disease (PID), moderate or severe endometriosis, concomitant adnexal masses, indication for adnexectomy, and nulliparity without uterine descent. Exclusion criteria: anaesthetic contraindications for laparoscopic surgery; suspicious adnexal mass on ultrasound; ovarian blood flow and tumour markers; vaginal narrower to less than two fingers wide; immobile uterus with no descent and no lateral mobilisation.
Interventions	VH versus LH [LH(a)]. LH(a) arm (considered LH type IV): included coagulation and sectioning of the round ligament, utero-ovarian ligaments with fallopian tubes when ovaries were conserved, and the infundibulopelvic ligaments when ovaries were removed; opening of the bladder flap and bladder dissection, uterosacral ligaments, base of cardinal ligaments, and uterine vessels. Vaginal phases included circular incision of the vagina and, when necessary, wedge morcellation, coring, or bivalving. Peritoneal closure and closure of the vaginal vault concluded the vaginal phase, at which time the pelvis and abdomen were re-evaluated through the laparoscope to be sure of haemostasis and for pelvic lavage. VH arm: according to modified Heaney technique. Both groups received prophylactic antibiotic treatment (cefazolin 2g IV) at the beginning and anticoagulant therapy with low molecular weight heparin the evening before the operation.

Darai 2001 (*Continued*)

	Endotracheal GA. Surgeons experienced in laparoscopic and vaginal surgery completed all the operations. Follow up: 6-8 weeks after surgery.
Outcomes	Intra-operative and post-operative complications; febrile morbidity; analgesia requirement; post-operative hospital stay; conversion to laparotomy; uterine size and weight.
Notes	France. Two hospitals in Paris. Funding not reported.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	Pre-determined computer-generated randomisation code
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Yes	
Free of other bias?	Yes	

Drahonovsky 2006

Methods	Duration: March 2004 - October 2005 (1 year, 6 months). Randomisation: not reported. Single centre study. Blinding not reported. Number of women randomised = 85. LAVH n = 44 and TLH n = 41. TLH was converted to LAVH in 6 cases. LAVH was converted to AH in 3 cases. Power calculation performed for sample size: not reported. Analysis by intention to treat: not reported.
Participants	85 women with a mean age of 49 years in LAVH group and 48 years in TLH group. women were recruited from a hospital in Prague, Czech. Inclusion criteria: women with benign uterine disease. Exclusion criteria: laparoscopy contraindicated, suspicion of malignancy, uterine size more than 3rd month of gestation at clinical examination, or more then 120 x 80 x 80 mm at ultrasound scan, necessity of accessory surgical procedure, urinary incontinence and prolapse stage >1st degree.

Drahonovsky 2006 (*Continued*)

Interventions	LAVH versus TLH. Surgical procedures not reported. Both groups received prophylactic antibiotic treatment (cefoxitin 1.5 g IV) and heparinisation. GA for both LAVH and TLH. Number of surgeons: not reported. Surgeons experience: all active surgeons of the institute participated in the surgical procedures, trainees inclusive. Duration of follow up: not reported.
Outcomes	Primary outcome: not reported. Outcome measures: operation time (anaesthesia time and skin to skin time which excluded time needed to insert uterine manipulator), blood loss, drop of haemoglobin, complication and conversion rate, use of analgesics and antibiotics, inflammatory response, hospital stay.
Notes	Czech Republic. Hospital in Prague. Funding: supportive grant. Paper in Czech language. Translation was commissioned.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Unclear	Not reported
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Unclear	Not reported
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported
Free of other bias?	Unclear	Analysis according to intention to treat unclear

Ellstrom 1998

Methods	Duration: not reported. Randomisation: method not stated and allocation concealment not reported. Single centre study, parallel group design with no blinding. Number of women randomised = 40. No dropouts reported. No power calculation for sample size was reported.
Participants	40 women with a mean age of 46 years (LH(a) group) and 48 years (AH group). Inclusion criteria: scheduled for abdominal hysterectomy for benign disorders; maximum width of uterus, measured by transvaginal ultrasound, less than 11 cm. American Society of Anaesthesiologists (ASA) Grade 1. Exclusion criteria: not reported.
Interventions	AH versus LH [LH(a)]. Both groups stratified to total and subtotal hysterectomies. LH(a) arm: total hysterectomy (n=14) and laparoscopic subtotal hysterectomy (n=6). The laparoscopic part of the total hysterectomy was finished when the uterine artery and parts of the sacrouterine ligaments were transected. The operation was then continued vaginally. Second generation cephalosporin and metronidazole intravenously were given during the operation and by oral administration for 2 days after surgery. With the subtotal hysterectomy, morcellation was carried out after transection of the uterine arteries using a mechanical or an electrical morcellator. The cervical canal was desiccated with bipolar cautery. AH arm: total hysterectomy (n=14) and subtotal hysterectomy (n=6). With the abdominal hysterectomies, standard surgical techniques were used. A lower midline or Pfannenstiel incision was made. The type of incision was left to the individual surgeon and patient to decide. Both groups received standardised anaesthesia; flunitrazepam (1 mg) was given as premedication approx 2 hrs before surgery. Anaesthesia was induced with propofol (1.5-2.5 mg per kg body weight). Morphine (100 uG per kg body weight) was given for perioperative analgesia. Neuromuscular block was achieved with vecuronium (0.1 mg per kg body weight). Suxamethonium (1.0 mg per kg body weight) was administrated for optimal intubation. Anaesthesia was maintained with isoflurane in oxygen/air. Morphine was post-operatively self-administered by the patients by programmable infusion pump containing morphine 1.0 mg/ml. Additional analgesic medication was restricted to paracetamol. Patients with nausea were given 10 mg metoclopramide. Surgeon experience: not reported. Follow up: assessment of pain, nausea and vomiting, 8 PM day of surgery, 10 am and 6 PM first day and 10 am second postoperative day. Pulmonary function assessed preoperatively and 10 am, first and second day. Time of anaesthesia, surgery, per and postoperative complications and difference in erythrocyte volume fraction (EVF) before and 2 days after surgery.
Outcomes	Primary: post-operative pain, pulmonary function. Secondary: time of anaesthesia, time of surgery, per and post-operative complications, difference in erythrocyte volume fraction (EVF).
Notes	Sweden. University Hospital of Sahlgrenska.

Ellstrom 1998 (*Continued*)

	Funding: Goteborg Medical Society Fund, Swedish Medical Research Council.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	Not reported
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Yes	
Free of other bias?	Unclear	Analysis according to intention to treat unclear

Falcone 1999

Methods	Duration: September 1995 - February 1997 (1 year, 6 months). Randomisation: assigned according to a computer-generated randomisation schedule with random block sizes. Single centre study, parallel group design with no blinding. Number of women randomised = 48, number analysed = 44. 4 withdrew before surgery (3 AH group and 1 LH(a) group). Power calculation performed for sample size. 22 patients per group were necessary to detect a difference of 30 minutes or more in surgical time between the 2 groups with 90% power with a significance level of 0.05. Analysis was by intention to treat.
Participants	44 women with a mean age of 42.8 years (LH(a) group) and 43.8 years (AH group). Inclusion criteria: scheduled for abdominal hysterectomy for benign disease. Exclusion criteria: pelvic mass size greater than 2 cm below the umbilicus; concomitant incontinence or pelvic reconstructive procedures required.
Interventions	AH versus LH [LH(a)]. LH(a) arm: three 10-mm trocar sites - 1 umbilical and 1 in each lower quadrant lateral to inferior epigastric artery 6 to 8 cm above pubic rami. Uterine arteries occluded laparoscopically with electrocautery. Cardinal ligaments cut laparoscopically. If the uterus had minimal descent, uterosacral ligaments were also cut laparoscopically. Vagina incised either laparoscopically or vaginally, depending on the ease that this could be achieved. Either anterior or posterior fornix, depending on access. Surgery then completed vaginally. Vaginal cuff closed vaginally. Performed by senior author with assistance from pelvic surgery fellow or resident.

Falcone 1999 (*Continued*)

	AH arm: procedure not reported. Follow up: daily diary for 6 weeks.
Outcomes	Operative time; blood loss; length of hospital stay; uterine weight; intra-operative complications; post-operative pain; return to work/normal activities and hospital costs.
Notes	USA. Cleveland Clinic Foundation, Ohio. Funding by Ethicon Endosurgery and the Minimally Invasive Centrer of the Cleveland Clinic Foundation.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	Computer-generated randomisation schedule with random block sizes
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	No blinding
Incomplete outcome data addressed? All outcomes	Yes	4 patients withdrew before surgery and data were included where possible
Free of selective reporting?	Yes	
Free of other bias?	No	Funding from pharmaceutical or surgical instrumentation company

Ferrari 2000

Methods	Duration: 24 months. Randomisation: sealed opaque envelopes containing computer-generated randomisation numbers. Single centre study, parallel-group design with no blinding. Number of women randomised = 62. No dropouts recorded. With three women in the LAVH group, the procedure was converted to a AH. In all cases the decision was made during the laparoscopic part of the procedure. No power calculation for sample size was reported.
Participants	62 women aged from 43 to 50 years. Inclusion criteria: symptomatic uterine fibroids. Exclusion criteria: history of severe pelvic disease; lack of uterine accessibility and mobility or a sonographically estimated uterine volume > 1500 mL (abdominal hysterectomy). Women without a history of severe pelvic disease, with an accessible and mobile uterus and a sonographically estimated uterine volume <500 mL, underwent a vaginal

Ferrari 2000 (*Continued*)

	hysterectomy.
Interventions	AH versus LH [LAVH]. LAVH arm: visualisation of the pelvis and upper abdomen, the treatment of adhesions or endometriosis when present, and the completion of the upper part of the hysterectomy. Round ligaments, tubes and utero-ovarian ligaments were desiccated and transected when the adnexa were to be preserved, while the round and infundibulopelvic ligaments were desiccated and transected when the adnexa were to be removed. The broad ligaments were dissected to their lower margin. When the bladder was stretched over the anterior aspect of the uterus due to previous surgery, the bladder flap was developed laparoscopically. The vaginal part of the hysterectomy included colpoceliotomy an bilateral ligation and transection of utero-sacral ligaments, uterine vessels and cardinal ligaments; cervical amputation, corporal hemisection, myomectomy and uterine morcellation were performed when necessary. AH arm: performed according to a standard technique. Surgeon experience: not reported. Women were followed up until discharge from hospital. Post-operatively, temperature and analgesic requirement were recorded daily.
Outcomes	Operating time; blood loss; complications; febrile morbidity; analgesic administration and hospital stay.
Notes	Italy. San Paolo Biomedical Sciences Institute, University of Milan. Funding not reported.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	Computer-generated randomisation numbers
Allocation concealment?	Yes	Sealed opaque envelopes
Blinding? All outcomes	No	Blinding not reported.
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported
Free of other bias?	Yes	

Garry 2004

Methods	Duration: November 1996 - September 2000 (4 years). Randomisation: 2:1 imbalance randomisation method. Allocation to abdominal or vaginal trial by surgeon. Randomisation to conventional or laparoscopic approach was by telephone and performed with a computer-generated programme. Multicentre study (n=30), parallel group design with no blinding. Number of women randomised: 1380. Abdominal trial: 876 (AH: 292. aLH: 584), Vaginal trial: 504 (VH:168, vLH:336). Number of patients that withdrew pre-operatively : AH:6, aLH:11,VH:5, vLH:12. Power calculation to estimate sample size performed. The sample size for the abdominal trial was calculated on the basis of 9% of AH had major complications. In order to detect a reduction complication rate of 50%, a sample size of 450 in each arm was required using 80% power and a two-sided type 1 error rate of 5%. Analysis by intention to treat and results were confirmed using a per-protocol analysis.
Participants	1380 women with a mean age of 41 years. Inclusion criteria: Women who needed hysterectomy for non-malignant conditions. Exclusion criteria: confirmed or suspected malignant disease of any part of the genital tract; 2nd or 3rd degree uterine prolapse; a uterine mass greater than the size of a 12-week pregnancy; any associated medical illness precluding laparoscopic surgery; a requirement for bladder or other pelvic support surgery and patient refusal of consent for the trial.
Interventions	4 arms: VH, LH in the vaginal trial (vLH); AH and LH in the abdominal trial(aLH). Surgical procedures were not reported. Surgeons recruited had to have performed at least 25 of each type of procedure. Surgeons of all grades and experience participated. Follow up: 6 weeks, 4 months and 1 year.
Outcomes	Primary outcomes: major complications (major haemorrhage, bowel injury, ureteric injury, bladder injury, pulmonary embolus, anaesthesia problems, unintended laparotomy, wound dehiscence, haematoma). Secondary outcomes: Minor complications (major haemorrhage, anaesthesia problems, pyrexia, infection, haematoma, DVT); blood loss; pain; analgesia requirement; sexual activity; body image; health status; length of surgery; length of hospital stay.
Notes	UK (28 centres) and South Africa (2 centres). Funding: National Health Service Research and Development Health Technology Assessment Programme, UK.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Randomised with use of computer-generated program
Allocation concealment?	Yes	Telephone inquiry
Blinding? All outcomes	No	Blinding not reported

Garry 2004 (*Continued*)

Incomplete outcome data addressed? All outcomes	Yes	17 patients in each trial withdrew before surgery and sensitivity analysis was performed. Quality of life outcome at baseline reported in 76 % of women
Free of selective reporting?	Yes	
Free of other bias?	Yes	

Harkki-Siren 2000

Methods	Duration: March - September 1997 (6 months). Randomisation: sequentially numbered, opaque and sealed envelopes. Single centre study, parallel-group design with no blinding. Number of women randomised = 50. No dropouts reported. Tissue trauma analysis for 18 uncomplicated hysterectomies in both groups were included. Power calculation for sample size performed (21 women in each group would be needed for 90% study power and for differentiation of 10 mg/L (standard deviation) between the means of C-reactive protein (CRP) concentration when type I error is 5%. For 80% study power, 15 women in each group needed).
Participants	50 women with mean age 47 years (LH(a) group) and 48 years (AH group). Inclusion criteria: scheduled for AH for benign reasons. Exclusion criteria: major medical diseases; BMI above 32 kg/m^2; size of uterus larger than of 14 weeks of pregnancy or uterine width greater than 10 cm by transvaginal ultrasonography; severe adhesions or endometriosis; prolapse and any other contraindications for laparoscopy.
Interventions	AH versus LH [LH(a)]. LH(a) arm : A 5-mm trocar was inserted supra pubically. Pelvis was inspected and ureters located. The uterosacral ligaments were coagulated with bipolar electrocoagulation and cut with unipolar scissors, as were the infundibulopelvic vessels and ligaments (if adnexa were to be removed) or the round ligaments, Fallopian tubes and utero-ovarian ligaments (adnexa not removed). The vesical peritoneum was opened with scissors and the bladder pulled down. Uterine vessels were prepared free and divided. The anterior fornix of the vagina was opened laparoscopically with monopolar scissors, the uterus was removed vaginally and the vagina was closed with resorbable suture. AH arm: Operated on in a standard manner through a lower midline or Pfannestiel incision. Diathermy was used only for haemostasis and peritoneal closure was performed. All women received 500 mg metronidazole intravenously at the beginning of anaesthesia and operations were performed under GA with endotracheal intubation in both groups. The bladder was drained with a Foley catheter in all women. A drain was left from the perineal cavity in both groups. Surgeon experience: not reported. First follow-up visit was scheduled 4 weeks after the operation and then followed up until complete recovery.

Harkki-Siren 2000 (*Continued*)

Outcomes	Operating time; anaesthetic time; blood loss; haemoglobin change; hospital stay; sick leave and complications.
Notes	Finland. Jorvi Hospital, Espoo. Funding: The Clinical Research Institution of Helsinki University Central Hospital and Jorvi Hospital, The Finnish Medical Foundation and The Research Foundation of Orion Corporation.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Patients were randomly allocated
Allocation concealment?	Yes	Sequentially numbered and sealed opaque envelopes
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Yes	
Free of other bias?	No	Tissue trauma reported in uncomplicated surgeries only Funding from pharmaceutical or surgical instrumentation company

Hwang 2002

Methods	Duration: June 1999 - May 2001 (2 years). Randomisation: sealed envelopes containing computer-generated block randomisation numbers, block size of 10. Single centre study, parallel group design with no blinding. Number of women randomised = 90. No dropouts reported. Power calculation to estimate sample size performed for surgery time. Power of analysis was 80% at alpha=0.05. Result of power calculation not reported.
Participants	90 Women with a mean age of 45.1 years. Inclusion criteria: scheduled for hysterectomy for uterine fibroids; myoma diameter larger than 8 cm and second myoma less than 5 cm or two myomata, both at least 6 cm in diameter but less than 8 cm (maximum number of fibroids was three). Exclusion criteria: indications of adenomyosis; uterine prolapse; chronic pelvic pain; dysfunctional uterine bleeding; cervical dysplasia; pelvic inflammatory disease.

Hwang 2002 (*Continued*)

Interventions	AH versus VH versus LH [LH(a)] AH arm: Abdomen opened by vertical midline or Pfannestiel skin incision. Uterus removed by extrafascial technique and vaginal cuff closed with continuous interrupted suture followed by re-peritonealisation. VH arm: Patients in Trendelenburg tilt position and given vasopressin injection. Anterior circumferential incision of the cervix and posterior V-shape incision. Anterior peritoneal cavity opened and cul-de-sac of Douglas entered. After uterine artery ligation, volume reducing techniques were performed vaginally. Peritoneum closed and uterosacral ligaments and vaginal vault sutured. LH(a) arm: 10 mm trocar inserted into umbilical position, one 5 mm trocar in each lower quadrant and another inserted supra pubically. Uterosacral ligament incision and round and broad ligaments were excised. Anterior colpotomy was performed after ligation of the bilateral uterine artery. The rest of the hysterectomy was completed vaginally. The uterus was removed vaginally by volume reducing techniques and the vaginal cuff was closed. All operations performed under general anaesthesia by second author, with the assistance of the other authors. Standardised post-operative protocol of 2 doses of IV meperidine 50 mg every 4 hours for pain control followed by acetaminophen 325 mg every 6 hours. Prophylactic antibiotics (cephalosporin 1.0 gm every 8 hours (three doses/day) combined with aminoglycoside 80 mg every 12hours (two doses/day), for one day were administered to all after surgery. Follow up: 6 weeks after surgery.
Outcomes	Operating time; hospital stay; intra-operative blood loss; complications; post-operation tenderness score; return to work; antibiotics used.
Notes	Taiwan. Shin Kong Wu Ho-Su Memorial Medical Centre, Taipei. Funding not reported.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	Computer-generated block randomisation numbers
Allocation concealment?	Yes	Sealed opaque envelopes
Blinding? All outcomes	No	Blinding not reported.
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Yes	
Free of other bias?	Yes	

Kluivers 2007

Methods	Duration: August 2002 - January 2005 (2 years, 6 months). Randomisation: numbered sealed opaque envelopes. Single centre study, parallel-group design with no blinding. Number of women eligible = 88, and randomised = 59. Dropouts: in the LH group, one woman refused the allocated procedure and an AH was performed. There were two intra-operative conversions to AH. There were two patients with re interventions (laparotomy) in the AH group. At 12 weeks the follow up was complete in 81% of the LH group and 94% of the AH group. Power calculation was performed for sample size. 28 patients per group were necessary to detect a difference between the 2 groups of 15 units or more on each of the 8 RAND-36 sub scales with standard deviation 20 units and 80% power with a significance level of 0.05. Analysis was by intention to treat.
Participants	59 women with a mean age of 46 years in both groups. Inclusion criteria: women with benign disease in whom VH was not possible and LH was feasible. Exclusion criteria: suspicion of malignancy, a previous lower midline incision, the need for simultaneous procedures like prolapse repair, inability to speak Dutch.
Interventions	TAH versus TLH. AH was performed according to the extrafascial technique (clamps and suture ligation). LH were intentional TLH procedures, using the Storz uterine manipulator type Clemont Ferrand, and a 4 port technique with bipolar coagulation and scissors. Opening the bladder flap and colpotomy (with the use of monopolar coagulation) were performed laparoscopically, as well as laparoscopic extracorporeal suturing of the vagina. Both groups received prophylactic antibiotic treatment (Amoxicillin Clavulanate 2.2 gm IV) and anticoagulant therapy. GA for both AH and LH. Ten different surgeons carried out AH, of whom three surgeons also carried out LH. Surgeon experience: (supervising) surgeons had performed at least 100 procedures. Women were followed up until three months after surgery.
Outcomes	Primary outcome: quality of life (questionnaire RAND-36). Secondary outcomes: operative time; blood loss; operative complications (injury to adjacent organs, haemorrhage, anaesthesia problems); conversions to AH, LAVH, LH(a) or subtotal hysterectomy; haemoglobin decrease; post-operative complications; hospital stay; use of opoids and anti-emetics.
Notes	The Netherlands. Maxima Medical Centre, Veldhoven. No funding.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Patients were randomly allocated

Kluivers 2007 (*Continued*)

Allocation concealment?	Yes	Sealed opaque envelopes shuffled and sequentially numbered
Blinding? All outcomes	No	No blinding
Incomplete outcome data addressed? All outcomes	Yes	1 refused assigned procedure and was analysed in assigned treatment group
Free of selective reporting?	Yes	
Free of other bias?	Unclear	Different group of surgeons for different procedures. More residents as first surgeon in AH

Kunz 1996

Methods	Duration: November 1993-February 1995 (1 year, 4 months). Randomisation: method not reported. Single centre study, parallel-group design with no blinding. Number of women randomised = 70, number analysed = 70. No power calculation for sample size was reported.
Participants	70 women with a mean age of 43 (LAVH group) and 48 years (AH group). Inclusion criteria: scheduled for hysterectomy for non-malignant diseases. Exclusion criteria: not reported.
Interventions	AH versus LH [LAVH]. LAVH arm: A curette is inserted into the uterus and the laparoscopic video camera is introduced. Two 5 mm trocars were inserted. Division of the adnexopexy from the uterus or the infundibulopelvic ligaments and round ligaments was accomplished with tissue tension, bipolar coagulation and the use of hook scissors. Transverse incision on the anterior fold of the broad ligaments bilaterally and transection of the visceral peritoneum at the bladder resection. Separation of the posterior fold of the broad ligaments, uterine arteries are skeletonized and demonstrated close to the uterus (2 cm). The hysterectomy was continued vaginally. The cervix was circumcised and the vaginal skin is reflected. Reflection of the bladder and the anterior peritoneum is demonstrated. The pouch of Douglas is entered and the sacrouterine ligaments are clamped and ligated. Uterine arteries are clamped and ligated bilaterally and the uterus extracted vaginally. The sacrouterine ligaments are fixed together and the vagina is closed in interrupted sutures. AH arm: The abdominal hysterectomies followed a common technique (Ober and Meinrenken 1964). Both groups received peri-operative antibiotic prophylaxis with 2 gm of Ceftriaxon, 15 minutes prior to the operation. Both groups had a pre and post-operative vaginal ultrasound scan. Pre and post-operative blood tests and measured CRP post-operatively (day 1 and 3). Post-operative analgesia was piritramid (22 mg ampoule), pentazocin (30 mg ampoule)

Kunz 1996 (*Continued*)

	and tramadol hydrochloride (100 mg orally).
Outcomes	Operating time, pain relief, size of uterus, haemoglobin change, stay in hospital and complications.
Notes	Germany. Hospital in Stuttgart. Funding not reported. Paper in German language. Translation was commissioned.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	Not reported
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported
Free of other bias?	Yes	

Langebrekke 1996

Methods	Duration: not reported. Randomisation: sealed envelopes containing the assignment prepared by randomisation, using a table of random digits, numbered 1 to 100. Multicentre study (n=2), parallel group design with no blinding. Number of women randomised = 100, number analysed = 100. No power calculation for sample size was reported.
Participants	100 women. The age of the women was not reported. Inclusion criteria: women with indications for elective hysterectomy. Exclusion criteria: proven or suspected malignancies in the pelvic area, suspected intra-abdominal adhesions; uterus enlarged beyond the size of a 12 week size pregnancy; serious cardiopulmonary disease; previous colporrhapy.
Interventions	AH versus LH [LH(a)]. LH(a) arm: A 10-mm laparoscope was inserted through the umbilicus and a general inspection of the entire pelvic cavity was performed. Two 5 mm trocars were introduced into the iliac fossae. A 12 mm trocar was placed in the midline 4 cms below the umbilicus

Langebrekke 1996 (*Continued*)

	in cases where the automatic stapler endo-GIA was used. Bipolar diathermy or GIA were used to divide the ligaments. With unipolar scissors, the vesicouterine perineal fold was cut and the bladder mobilised. The uterine arteries were coagulated with bipolar diathermy. The vagina was opened laparoscopically with unipolar scissors and the uterus removed vaginally. The vagina was closed with resorbable sutures from below, the sutures including the cardinal ligaments. All operations performed exclusively by two of the authors. AH arm: according to standard techniques. Abdomen was entered via a Pfannenstiehl incision. The entire abdominal cavity was palpated and the pelvis inspected. The uterine ligaments were clamped and ligated. The bladder peritoneum was opened and the bladder was mobilized away from the cervix and upper anterior vaginal wall. Uterine vessels were clamped, cut and ligated. The vagina was closed with resorbable sutures. Performed by any skilled gynaecologist in the department. Cephalosporine (2 g IV) and low molecular heparin (injected subcutaneously) was given to both groups post-operatively. Follow up: until women returned to work/normal activities.
Outcomes	Operation time; hospital stay; time elapsed before resuming work; post-operative pain; complications and blood loss.
Notes	Norway (2 centres). Aker University Hospital, Oslo, and Akershus central Hospital, Oslo. Funding not reported

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Table of random digits
Allocation concealment?	Yes	Sealed envelopes
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported
Free of other bias?	Unclear	Different group of surgeons for different procedures

Long 2002

Methods	Duration: November 1999 - December 2000 (1 year, 1 month). Randomisation: randomly assigned to treatment groups. Method not stated and allocation concealment not reported. Single centre study, parallel group design with no blinding. Number of women randomised = 167. Number of dropouts = 13. Number of women analysed = 101 (women excluded if hysterectomy performed for reasons other than uterine fibroids of adenomyosis). No power calculation for sample size or intention-to-treat analysis was reported.
Participants	101 women with a mean age of 45.9 (LAVH group) and 45.5 (TLH group). Inclusion criteria: indications of uterine fibroids of adenomyosis and contraindications for VH - uterine weight >280 g, previous pelvic surgery, history of PID, need for adnexectomy, lack of uterine descent and limited vaginal access. Criteria for choosing laparoscopic hysterectomy was based on the uterine volume, less than that of a 16 weeks pregnancy (700 g). Exclusion criteria: suitable for a vaginal hysterectomy and the uterine volume was greater than a 16 week pregnancy.
Interventions	LAVH versus TLH [a comparison of two LH techniques]. LAVH arm: if the ovaries were to be conserved, the Fallopian tubes, round and uteroovarian ligament was resected with bipolar forceps and scissors. For adnexectomy, mesosalpinx, round and infundibulopelvic ligament were resected. Laparoscopic dissection of the bladder flap, resection of the broad ligaments, anterior and posterior colpotomies were performed. Proceeded vaginally - clamping, transecting and suture ligating of uterine vessels, cardinal and uterosacral ligaments. Closure of peritoneum and vaginal vault anchored to the cardinal-uterosacral ligament complex after removing uterus. TLH arm: Same manner as the LAVH procedure above the uterine artery level. After dissection of the bladder flap and resection of the broad ligament, the uterine artery was coagulated by bipolar electrocoagulator and separated from the uterine sidewall by scissors. Bilateral desiccation and transection of the cardinal-uterosacral ligament complex. Circular colpotomy was performed close to the cervix and uterus was removed through the vagina. All operations performed under GA and by the same gynaecologist for each procedure (LAVH by one surgeon and TLH by another). Post-operative analgesia included lysine aspirin which was administered intravenously. Antibiotic prophylaxis IV cefazolin 1 gm administered pre and post-operatively. Follow up: until discharged from hospital.
Outcomes	Operation time, blood loss, hospital stay, cost, complications and sexual symptoms.
Notes	Taiwan. Kaohsiung Municipal Hsiao Kang Hospital. Funding not reported.

Risk of bias

Item	Authors' judgement	Description

Long 2002 (*Continued*)

Adequate sequence generation?	Unclear	Not reported
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	No	13 dropouts (excluded from analysis after randomisation because of conversions to AH (n=3), incomplete records (n=7) or combined surgical procedures (n=3))
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported
Free of other bias?	No	Analysis not according to intention to treat. Different surgeons for different procedures

Lumsden 2000

Methods	Duration: 2 years. Randomisation: performed by the research nurse using a computer-generated schedule. Multicentre (n=3) study, parallel group design with no blinding. Number of women randomised = 200, number analysed = 190. 7 did not attend for operation and the case records were not available for a further 3 women. Power calculation to estimate sample size performed. 120 patients per arm allowed an 80% chance of detecting a 15% difference in complication rates at a 5% level using a two-sided test. Analysis was stated as by intention to treat (8 women did not have LAVH as randomised but were analysed in the LAVH group).
Participants	190 women with a mean age of 42.7 years (AH group) and 41.1 (LH group). Inclusion criteria: scheduled for AH for benign gynaecological disease and they were not suitable for VH because of a uterine size in excess of 14 weeks or a requirement for oophorectomy. Exclusion criteria: suitable for VH.
Interventions	AH versus LH. Operation procedures not reported. Performed by 5 consultant gynaecologists who have undertaken a minimum of 50 LH procedures. Follow up: women asked to keep a diary of recovery 'milestones' and reviewed by the research nurse four weeks after surgery. Euroqol Health Questionnaire completed at one, six and 12 months after surgery.
Outcomes	Length of operation; length of hospital stay; admission to ITU; readmissions; women requiring additional surgery; blood transfusions; complications (major and minor); patient reported outcomes; costs and change in health status.

Lumsden 2000 (*Continued*)

Notes	Scotland. Three hospitals in Glasgow. Funding: Scottish Home and Health Department, Scotland.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Computer generated
Allocation concealment?	Yes	By third party (research nurse)
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	No	10 dropouts were not analysed. 7 women did not attend surgery and 3 records were not available
Free of selective reporting?	Yes	
Free of other bias?	Yes	

Marana 1999

Methods	Duration: October 1995 - November 1996 (1 year, 1 month). Randomisation: computer-generated sequence. Multicentre study (n=4), parallel-group design with no blinding. Number of women randomised 116, number analysed 116. Power calculation performed for sample size, the sample size was selected to detect a difference of 25% in total complication rates with a power of 80% at the 5% level of significance, given a complication rate in the control group of 42%. No dropouts.
Participants	116 women with a mean age of 49 years. Inclusion criteria: scheduled for AH for benign disease and had one or more of the following contraindications to VH: uterine size >280 g and an upper limit of 16 weeks gestation (700 g); previous pelvic surgery; history of pelvic inflammatory disease; moderate or severe endometriosis; concomitant adnexal mass or indication for adnexectomy; and nulliparity with lack of uterine descent and limited vaginal access. Exclusion criteria: suitable for VH.
Interventions	AH versus LH [LAVH]. LAVH arm: 10-mm laparoscope introduced through the umbilicus, and 3 accessory 5 mm reusable trocars were introduced supra pubically. The pelvis and upper abdomen were then accurately evaluated, and endometriotic lesions, adhesions, or ovarian cysts, when present, were treated appropriately. When the ovaries were to be conserved, bipolar forceps and scissors were used to resect the round and uteroovarian ligaments with the fallopian tubes.

Marana 1999 (*Continued*)

	For adnexectomy, bipolar forceps and scissors were used to resect the round and infundibulopelvic ligaments, mesosalpinx, and mesovarium. Opening of the bladder flap was performed at the laparoscopic phase, whereas bladder dissection was performed during the vaginal phase. Laparoscopic haemostasis was achieved using exclusively bipolar electrocoagulation. The vaginal phase included circular incision of the vagina; bladder dissection to the laparoscopically opened bladder flap; entry in the posterior cul-de-sac; and clamping, transecting, and suture ligating of uterosacral ligaments, base of cardinal ligaments, and uterine vessels. Where necessary, wedge morcellation, coring, or bivalving was performed. Peritoneal closure with pedicles exteriorised and closure of vaginal vault anchored to the uterosacral and cardinal ligaments concluded the vaginal phase. AH arm: performed according to the technique described by Mattingly and Thompson. Surgeon experience: not reported. Pre-operative evaluation of uterine size, mobility and pelvic sonogram. Haemoglobin and haematocrit determinants performed for autologous blood transfusion, performed if Hb level > 11 g/100 mL. All received antibiotic prophylaxis (intravenous piperacillin 2 gm) administered 30 mins before surgery. Post-operative medication consisted of the administration of ketorolac by intramuscular injection or by mouth every 6 hours for the first 24 hours. Post-operative follow up included evaluation of pain on post-operative days 1, 2 and 3, length of post-operative hospital stay and evaluation of post-operative complications. Duration: until patient left hospital.
Outcomes	Blood loss; postoperative fever; post-operative pain; length of post-operative hospital stay; post-operative complications; haemoglobin reduction and intra-operative conversion to abdominal surgery.
Notes	Italy. Four University Hospitals. Funding not reported.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Computer generated
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Yes	
Free of other bias?	Yes	

Miskry 2003

Methods	Duration of trial not stated. Randomisation: computer-generated in blocks of 10; sequentially numbered sealed opaque envelopes, opened by nursing staff immediately prior to surgery. Double blind until discharge from hospital, maintained by a sham opaque lower abdominal dressing (unless pyrexia or other complication necessitated direct inspection of the abdomen) and vaginal staining with methylene blue in cases undergoing VH. Two centre study, parallel group design. Number of women randomised = 36, number analysed = 36. Power calculation performed and adhered to: 36 women required for 80% power to show a 2-day difference in hospital stay at P = 0.05.
Participants	36 women with mean age 42 years. Inclusion criteria: scheduled for elective hysterectomy. Exclusion criteria: genital tract malignancy; adnexal pathology; uterine size >14 weeks; need for concurrent procedure (e.g. vaginal repair, colposuspension); reduced uterine mobility on VE; inadequate vaginal access.
Interventions	AH versus VH. Total hysterectomy performed by standard technique for each route. Low transverse incision, closed with subcuticular absorbable suture, for AH; Heaney technique for VH. In all cases, concurrent oophorectomy performed if indicated; peritoneal and vaginal vault closed. Performed by most senior surgeon available. All GA plus caudal block for one VH case. Antibiotic prophylaxis co-amoxivlav 1.2 gm at induction of anaesthesia. Thromboprophylaxis heparin 5000 units at induction and twice daily until mobile. Follow-up at 6 weeks and 6 months with completion of SF-6 Short Form general health survey.
Outcomes	Primary outcome: duration of hospital stay. Secondary outcomes: analgesic requirements; complications; return to normal function.
Notes	UK. Royal Free and North Middlesex Hospitals. Funding not reported.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Randomised by computer
Allocation concealment?	Yes	Sealed opaque envelopes
Blinding? All outcomes	Yes	Sham abdominal dressing until discharge
Incomplete outcome data addressed? All outcomes	Yes	No dropouts

Miskry 2003 (*Continued*)

Free of selective reporting?	Yes	
Free of other bias?	Yes	

Morelli 2007

Methods	Duration: January 2002 - December 2004 (3 years). Randomisation: not reported. Single centre study, parallel-group design, blinding not reported. Number of women randomised = 420. Number of women analysed = 400. TLH = 200, VH = 200. (There were 75 lost to follow-up at one year (TLH = 35, VH = 40).) In the TLH group and VH group, there were 10 and 8 conversions to AH respectively. Power calculation performed for sample size: not reported. Analysis was by intention to treat.
Participants	400 women with a mean age of 41 in the TLH group and 42 years in VH group. Inclusion criteria: Women with benign disease including cervical pre-neoplasm. Exclusion criteria: prolapse grade 2 or 3, uterus>12 weeks, contraindication for laparoscopy.
Interventions	TLH and VH. Surgical procedures, including antibiotics, anticoagulants and mode of anaesthesia, not described. Number of surgeons and experience not reported. Learning curve effect in TLH in the first year of the study was reported. Women were followed up until one year after surgery.
Outcomes	Primary outcome: at least one major complication (bleeding/hematoma with transfusion or surgery, injury to adjacent organs, unintended laparotomy, wound dehiscence, pulmonary embolus, and major anaesthesia problems) Secondary outcomes: minor complications, minor anaesthesia problems, fever, infection, deep vein trombosis, pain assessment with VAS, questionnaires SF-12 and BIS.
Notes	Italy. University Hospital of Catanzaro. Funding not reported Paper in Italian language. Translation was commissioned.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Unclear	Not reported
Allocation concealment?	Unclear	Not reported

Morelli 2007 (*Continued*)

Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	No	20 dropouts were excluded from analysis
Free of selective reporting?	Yes	
Free of other bias?	No	Learning curve effect in TLH described

Muzii 2007

Methods	Duration: January 2005 - December 2005 (1 year). Randomisation: numbered sealed opaque envelopes based on a computer-generated allocation list; in operating room. Multicentre study, parallel-group design with no blinding. Number of women eligible: 86. Number of women randomised = 81. There were no dropouts. Conversions to AH: 2 in LAVH group and 4 in minilaparotomy group. Power calculation was performed for sample size. Actual sample size was necessary to detect a difference in complications between the 2 groups of 30% (complication rate 42% in control group) with 80% power with a significance level of 0.05. Intention-to-treat analysis was possible from data but not performed by authors on all outcomes.
Participants	81 women with a mean age of 49 years in the LAVH group and 48 years in the minilaparotomy group. Inclusion criteria: Benign disease: myoma and/or abnormal uterine bleeding with and without adnexal masses. Contraindication for vaginal hysterectomy. Exclusion criteria: Uterine size greater than 700 gr on ultrasound, previous midline incision, absolute contraindication to laparoscopy.
Interventions	LAVH versus mini-laparotomy. LAVH: 4 port technique, laparoscopic dissection with bipolar forceps and scissors of either round and utero-ovarian ligaments or infundibulo-pelvic ligaments. Opening bladder flap, followed by vaginal hysterectomy. Uterosacral/ cardinal ligament complex was anchored vaginally to vaginal vault. Laparoscopy at the end of the procedure. Minilaparotomy: Trendelenburg position, 4 to 9 cm transverse incision, moving operative window with three retractors. Ligaments cut after electrocoagulation, whereas vascular pedicles clamped, ligated and cut. Vaginal vault abdominally closed with running suture and suspension to uterosacral/cardinal ligament complex. Both groups received prophylactic antibiotic treatment (cephalosporin IV). GA for both LAVH and mini-laparotomy. Women were followed up until discharge.
Outcomes	Primary outcome: overall complications. Secondary outcomes: operative time; conversions; haemoglobin drop (day1); VAS pain (day 1 and 2); time to return bowel function; hospital stay.

Muzii 2007 (*Continued*)

Notes	Italy. Three university hospital in Rome. Funding not reported

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Computer-generated list
Allocation concealment?	Yes	Numbered sealed opaque envelopes in operating room
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Yes	
Free of other bias?	Yes	

Ollson 1996

Methods	Duration: not reported. Randomisation: sealed opaque envelopes. 1:1 ratio. Single centre, parallel group design with no blinding. Number of women randomised = 143, number analysed = 143. Power calculation for sample size was performed, assuming a complication probability of 40% for AH, the power of predicting a difference in complication rate was at least 80% at the 5% level, two-sided test, provided that the probability of complications following LH(a) is at most 18% and at least 64% when 70 patients are included in each group.
Participants	143 women with median age 48 years. Inclusion criteria: scheduled for AH for benign disorders, with a maximum uterine width of less than 11 cm and not considered suitable for VH. Exclusion criteria: suitable for VH (adnexa are not to be removed; no suspicion of endometriosis or post-inflammatory disorders, when uterine size is normal, or in the case of uterovaginal prolapse, less than the size of an eight-week pregnancy).
Interventions	AH versus LH [LH(a)]. LH(a) arm: All patients were prescribed a second generation cephalosporin as well as metronidazole intravenously during the operation and by oral administration for 2 days after surgery. Ureters were identified, where this was difficult, the ureters were dissected free down to the level of the uterine arteries. If the adnexa were to be removed, the infundibulopelvic ligaments were transected by diathermal cautery and monopolar scissors. If the adnexa were to be conserved the utero-ovarian pedicles were transected on

	both sides, using the same instruments. The round ligaments and the upper portion of the broad ligaments were divided using monopolar scissors and the bladder was dissected to the level just below the vaginal cuff. The posterior part of the broad ligaments were divided by scissors close to the uterus, down to the upper part of the uterosacral ligaments, which were then transected. The uterine arteries were transected close to the uterus after bipolar coagulation. The upper portion of the cardinal ligaments were divided close to the uterus, after which an incision was made into the anterior fornix of the vagina. The vaginal phase: vaginal epithelium surrounding the cervix was transected as well as any residual tissue from the cardinal and uterosacral ligaments. The transected ligaments were ligated together and incorporated into the vaginal wall. 2 out of 5 surgeons of senior registrar grade and specifically trained in LH(a). AH arm: antibiotics were not routinely prescribed in this group of patients. They underwent either a lower midline or Pfannenstiel incision. If the adnexa were to be removed, the infundibulopelvic ligaments were clamped, transected and ligated. In cases where the adnexa were not to be removed, the utero-ovarian pedicles were transected and ligated. The anterior broad ligaments were divided down to the vesico-vaginal junction and the bladder reflected to just below the vaginal cuff. The uterine vessels were divided close to the uterus. Following division of the cardinal and uterosacral ligaments, the uterus was excised. The vaginal cuff was closed with interrupted sutures and the peritoneal layers closed and attached to the top of vagina. Two out of 10 surgeons of senior registrar grade trained in AH. Follow up: 4-6 weeks after surgery, all patients returned for a gynaecological examination including vaginal ultrasound. 6-8 weeks after surgery patients were asked to complete an anonymous questionnaire if they considered the duration of their post-operative hospital stay and sick leave to have been adequate. In a subgroup of patients (TLH: n=38; AH: n=38), postoperative health status and QOL were self assessed prospectively 1, 3, and 12 weeks after surgery using "The Medical Outcome Trust 36-item Short-Form Health Survey questionnaire".
Outcomes	Operating time (mins); complications; postoperative pain relief; convalescence (sick leave); hospital stay; QOL; economic analysis (cost).
Notes	Sweden. University Hospital of Sahlgrenska. Funding: Goteborg Medical Society Fund, Swedish Medical Research Council.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Unclear	Not reported
Allocation concealment?	Yes	Sealed opaque envelopes
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts

Ollson 1996 (*Continued*)

Free of selective reporting?	Yes	
Free of other bias?	Unclear	Different surgeons for different procedures?

Ottosen 2000

Methods	Duration: January 1996 - May 1998 (2 years, 5 months). Randomisation: computer-generated numbers and information on the allocation schedule was kept in sealed opaque envelopes prepared by and successively opened by the research nurse. Single centre study, parallel-group design with no blinding. Number of women randomised = 120, number analysed = 120. Randomly allocated to one of three operating methods in four blocks of 30 to ensure a balanced number of patients throughout study period. Interim analysis done after 25 patients were randomised to each group. Power calculation for sample size performed, sample size based on reported hospital stay for vaginal and abdominal hysterectomy of 2.3 and 4 days, respectively. If 1.5 is the SD for hospital stay, 40 women were randomised to achieve a power of 80% at alpha = 0.05.
Participants	120 women with mean age 47 years (AH group), 49 years (VH group) and 48 years (LAVH group). Inclusion criteria: scheduled for hysterectomy for anticipated benign causes. Inclusion: menorrhagia, leiomyomas <15 cm in diameter, dysplasia, endometrial atypia and pain. Exclusion criteria: ovarian pathology, uterus larger than 16 weeks of gestational size, previously known dense adhesions, narrow vagina or obvious inaccessible uterus.
Interventions	AH versus VH versus LH [LAVH] - three treatment arms. LAVH arm: the laparoscopic part was minimised. Trocars were left in place and after closing the vaginal wall the surgeon returned to laparoscopic view to confirm haemostasis. The surgery was performed under GA in 109/120 cases, spinal block in 3/120 or in combination with epidural block in 8/120 cases. AH arm: the abdomen was opened and closed in different ways according to surgeon preference. The uterus was removed by extrafascial technique and the vagina closed and covered by peritoneum. VH arm: the vault was injected with 20 mL of mepivacain/adrenalin before incision in order to minimise bleeding. The peritoneal folds were opened and ligaments and uterine vessels were divided. If at this time the uterine size did not allow easy exteriorisation, bisecting, coring, morcellation, enucleation or combinations of these volume-reducing techniques were performed. The peritoneum was closed, followed by suturing of the sacrouterine ligaments and vaginal vault. One of 15 gynaecological surgeons, experience varied and in some cases residents performed under supervision. All patients had at least one dose of prophylactic antibiotic peri-operatively, namely cefuroxim 1.5 gm intravenously and metronidazol 1gm rectally. A daily dose of exoxaparin 20 mg subcutaneously was given as thrombolic prophylaxis through the hospital stay. Follow up: 2 weeks post-operation in outpatient clinic for examination to detect complications and evaluate need for further sick leave.

Ottosen 2000 (*Continued*)

Outcomes	Duration of surgery, duration of anaesthesia, stay in hospital, recovery time, per-operative blood loss and complications.
Notes	Sweden. Hospital of Helsingborg. Funding: Thelma Zoegas Foundation and the Stig and Ragna Gorthons Foundation, Sweden.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	Randomised by computer
Allocation concealment?	Yes	Sealed opaque envelopes
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Yes	
Free of other bias?	Yes	

Perino 1999

Methods	Duration: January 1997 - 30 September 1998 (1 year, 9 months). Randomisation: method not stated and allocation concealment not reported. Single centre study, parallel-group design with no blinding. Number of women randomised = 102, number analysed = 102. No power calculation for sample size was reported. No reported dropouts.
Participants	102 women with a mean age of 48 years. Inclusion criteria: scheduled for hysterectomy for benign diseases. Exclusion criteria: not stated.
Interventions	AH versus LH [TLH]. TLH arm: After a CO_2 pheumoperitoneum was created, a 10 mm trocar was placed in the umbilical site to introduce the laparoscope and the camera. Three ancillary 5 m trocars were placed supra pubically. After an abdominal inspection, lysis of any adhesions was performed, the uterus was then mobilized. After bipolar coagulation, the round ligament was sectioned at 3 cm from the uterus. The areolar tissue of the broad ligament was then dissected and its posterior fold fenestrated at an avascular area above the uterine vessels. The infundibulo-pelvic ligament vessels were coagulated and cut using bipolar forceps and scissors under direct visualisation of the pelvic ureter. Once the uterine ligaments were sectioned, the operation continued centrally in a downward direction. If

Perino 1999 (*Continued*)

	the adnexae were not to be removed, the utero-ovarian ligament was coagulated and sectioned proximal to the ovaries. The vesico-uterine peritoneal fold was opened by scissors and a bladder dissection from the low uterine segment down to the upper part of the vagina was performed. The utero-sacral ligaments were then coagulated and sectioned. The uterine artery was skeletonised and then coagulated with bipolar forceps and cut with scissors. Incision and coagulation of the cardinal ligaments to expose the vaginal fornices, separated from the stump of the uterine artery. Circular colpotomy was then performed and the uterus was removed from the vagina. The vaginal vault was then sutured laparoscopically or vaginally. AH arm: Performed according to the technique described for benign disease (Mattingly and Thompson). All operations performed by the same team of three surgeons with experience of 100+ TLH procedures. Follow up: until women were discharged from hospital. Postoperative pain was assessed 3 days after surgery.
Outcomes	Operating time; blood loss; post-operative pain; postoperative decrease in haemoglobin; complications and duration of postoperative hospital stay
Notes	Italy. Gynaecologic University Hospital of Palermo. Funding not reported

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	Not reported
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported.
Free of other bias?	Yes	

Persson 2006

Methods	Duration: October 1996 - May 2003 (5 years, 6 months). Randomisation: bloc-randomisation by numbered sealed opaque envelopes (according random table). Multicentre study, parallel-group design with no blinding. Number of women eligible = 1360, and randomised = 125. Dropouts: there were 6 patients lost to followup (In the LH group 1 woman withdrew consent before the 5 weeks follow-up. In the AH group 1 woman withdrew consent before surgery but had the allocated treatment, and 4 women withdrew consent before the 5 weeks follow up.) In the LH group, there were three intra-operative conversions to AH. Power calculation was performed for sample size. 60 patients per group were necessary to detect a difference between the 2 groups of 10 units or more on the PGWB with 90% power, a significance level of 0.05, and a dropout rate of 20%. Analysis was by intention to treat.
Participants	119 women with a mean age of 44 years in both groups. Inclusion criteria: Women with benign disease, LH was feasible, fluent in Swedish. Exclusion criteria: genital tract malignancy, pre-operative GnRH analogues, post-menopausal women without HRT, psychiatric disorders.
Interventions	AH versus LH(a). AH was performed by Pfannenstiel incision and according to the extrafascial technique. LH were LH(a) procedures, with a 3-port technique. Parametrium and uterine artery were sealed laparoscopically with bipolar coagulation or stapling. Cardinal and uterosacral ligaments as well as suturing of vaginal cuff vaginally. In both procedures the vaginal cuff was anchored to the uterosacral ligaments without peritonealisation. Both groups received prophylactic antibiotic treatment (cefuroxime 1.5gm and metrinodazole 1gm IV). Surgeon experience: (supervising) surgeons were skilled and experienced. Women were followed up until six months after surgery.
Outcomes	Primary outcome: psychological well being (questionnaires PGWB). Secondary outcomes: questionnaires WHQ, STAI, BDI; operative time; complications, conversions to AH; hospital stay; return to normal activities.
Notes	Sweden. Two county hospitals, 2 central hospitals and 1 university hospital in the southeast. Funding: grants from the Medical Research Council of South East Sweden.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	According to random table
Allocation concealment?	Yes	Sealed opaque envelopes
Blinding? All outcomes	No	No blinding

Persson 2006 (*Continued*)

Incomplete outcome data addressed? All outcomes	No	6 dropouts after randomisation were not analysed (1 LH and 5 AH group)
Free of selective reporting?	Yes	
Free of other bias?	Unclear	Only 9% of eligible patients were randomised

Raju 1994

Methods	Duration: March 1992 - October 1993 (1 year, 8 months). Randomisation: sealed envelopes containing computer-generated block randomisation numbers. Block size of 10. Single centre study, parallel-group design with no blinding. Number of women randomised = 80, number analysed = 80. Power calculation for sample size performed, 40 patients in each arm were estimated to detect a 25% difference in morbidity between the groups, with a power of 90% at the 5% level. No dropouts were reported.
Participants	80 women with mean age of 46 years. Inclusion criteria: scheduled for hysterectomy and bilateral oophorectomy for benign conditions. Exclusion criteria: morbid obesity, uterus larger than 14 weeks gestation size, or uterovaginal prolapse.
Interventions	AH + BSO versus LH [LAVH] + BSO. LAVH+BSO arm: 5.5 mm flap-valved trocars were inserted enabling the insertion of laparoscopic instruments. 12 mm trocar and cannula were introduced supra pubically in the midline 3 cm above the upper border of the symphysis pubis as a port for the use of the Autosuture Multifire Endo GIA 30 stapling device.The cervix was grasped with a vulsellum and a broad-ended blunt uterine curette was inserted to manipulate the uterus from the perineal end. Any adhesions between the uterus or adnexae to adjacent structures were divided with scissors after diathermy coagulation. Both round ligaments were treated with diathermy and cut with scissors approx 3 cm from the internal inguinal ring whilst holding the ligament with a grasping forceps. The peritoneum of the anterior leaf of the broad ligament was dissected from the divided round ligament back towards the infundibulo-pelvic ligament thus opening the tissue space between the two folds of broad ligament. The posterior leaf of the broad ligament was then pierced with endoshears to make a window, a safe distance above the ureter which had been previously identified. The ovarian pedicle was then sized for thickness of tissue by means of a GIA endo gauge inserted through the midline suprapubic incision. The correct size of endo stapling clamp was selected. The ovarian pedicle was clamped and cut with the appropriate GIA endo stapling device, placed from the upper border of the infundibulo-pelvic ligament and with the jaws of the stapler passing well through the peritoneal window in the broad ligament. By using this technique each ovarian pedicle required only one firing of the GIA stapler to divide it. Finally the uterovesical fold of

Raju 1994 (*Continued*)

	the peritoneum was divided with scissors and sometimes the uterosacral ligaments were divided after diathermy coagulation. The uterus, tubes and both ovaries were then removed vaginally after circumcising the cervix and opening the pouch of Douglas to allow ligation and division of the cardinal ligaments and uterine vessels as in a traditional vaginal hysterectomy. The vaginal vault was anchored to the cardinal ligaments and closed with interrupted sutures. Operations performed on by one of the authors. AH+BSO arm: procedures were performed using a standard technique. Operations performed by one of the authors or by another surgeon of senior registrar grade. Premedication: temazepam 20mg, 2 hours before operation. GA induced with thiopentone and maintained with enflurane and nitrous oxide. Under anaesthesia a bolus intravenous injection of Augmentin, 1.2g was given. Antibiotic therapy continued for 7 days postoperatively Follow up: 6 weeks after surgery and until women return to work.
Outcomes	Operating time, blood loss, haemoglobin change, hospital stay, post-operative analgesia, complications, recovery time (subjective assessment of patient's general well being and return to normal activity), and cost.
Notes	UK. St Thomas's Hospital, London. Funding not reported.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Randomised by computer
Allocation concealment?	Yes	Sealed opaque envelopes
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Yes	
Free of other bias?	Unclear	Different surgeons for different procedures

Ribiero 2003

Methods	Duration: not reported. Randomisation: method not stated. Single centre study, parallel group design with no blinding specified. Number of women randomised = 60, number analysed = 60. No power calculation for sample size reported. No dropouts reported.
Participants	60 women with overall mean age 42.3 years (range 34 - 76 years). Inclusion criteria: benign uterine disease: myoma n=41; adenomyosis n=19. Exclusion criteria: uterine volume greater than 400 mls; use of any anti-inflammatory medication during preceding 3 months; diabetes mellitus; coagulation disorders; autoimmune diseases.
Interventions	AH versus VH versus LH [TLH]. AH by Thompson and Warshaw technique. VH by Heaney's technique. LH [TLH]: 10mm laparoscope inserted at umbilicus, two 5mm secondary ports for laparoscopic instruments. Uterine mobiliser with blunt tip used to antevert uterus and delineate vaginal fornices. Round ligaments divided with monopolar forceps and vesico-uterine fold divided with scissors and bladder mobilised until anterior vagina identified. Utero-ovarian ligament and fallopian tube pedicles desiccated with bipolar forceps, then scissors division of broad ligament peritoneum. Uterine artery grasped, elevated and bipolar coagulated. Cardinal and uterosacral ligaments divided with monopolar forceps. Vagina entered posteriorly near cervico-vaginal junction. 4 cm vaginal delineator outlined circumferentially the cervico-vaginal junction and prevented loss of pneumoperitoneum. Monopolar forceps completed the circumferential culdotomy. Uterus removed vaginally (after morcellation if necessary). Laparoscopic vaginal vault interrupted suturing and suspended by suture attachment to uterosacral/cardinal pedicles, sutures being tied extracorporally. Surgeon experience: not reported. Follow up: routinely up to 6 days. Antibiotic and thrombo prophylaxis not specified.
Outcomes	Operative time; pre and post-operative haemoglobin; complications.
Notes	Brazil. Sao Paulo University School of Medicine Hospital. Funding: Foundation of Research Support from Sao Paulo State.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	Not reported
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding not reported

Ribiero 2003 (*Continued*)

Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported
Free of other bias?	Yes	

Richardson 1995

Methods	Duration: not reported. Randomisation: random numbers table. Single centre study, parallel group design with no blinding. Number of women randomised = 45, number analysed = 45. No power calculation for sample size reported. No dropouts reported.
Participants	45 women with mean age of 41 years (LH group) and 45 years (VH group). Inclusion criteria: contraindications for vaginal surgery according to traditional criteria (absence of vaginal prolapse, nulliparity, uterine enlargement, previous pelvic surgery endometriosis and need for oophorectomy). Exclusion criteria: uterine size greater than the equivalent of 16 weeks' gestation, endometrial carcinoma, adnexal masses, known dense pelvic adhesions, or moderate/severe endometriosis.
Interventions	VH versus LH. LH arm: the laparoscope was inserted sub-umbilical incision, and usually two 5mm secondary portals were used for the laparoscopic instruments. Surgery was performed under the guidance of the image generated by a Supercam 9050 PB video chip camera attached to a 30 degree forward oblique laparoscope. The principal method of haemostasis was bipolar electrosurgical desiccation but Endo-GIA 30 linear staplers were used in 8 women. In 1 woman VH was done after diagnostic laparoscopy (stage 0 VH) and in 2 VH was carried out after laparoscopic adhesiolysis had made this possible (stage 1 LH). When the ovaries were conserved, bipolar diathermy was used medially to desiccate the round and ovarian ligaments, and the fallopian tube. The approach to the ovarian pedicle during oophorectomy depended on whether the uterine vessels were to be divided laparoscopically or vaginally. If divided vaginally, the ovarian vessels were coagulated and divided but not the round ligaments. Dissection then proceeded towards the uterine origin of the round ligament, after which the hysterectomy was completed vaginally (stage 2 LH) or after laparoscopic mobilisation of the bladder (stage 3 LH). If the uterine vessels were treated laparoscopically (stage 4 LH), the round ligaments were always divided, together with the ovarian vessels and fallopian tubes, and the dissection continued to the level of the uterine arteries which were then desiccated and cut close to the uterus. Laparoscopic dissection only continued further than the uterine artery in 3 cases (stage 5 LH), all other procedures being completed vaginally. VH arm: Modified Heaney approach. Surgeon experience: not reported. Follow up: 6-8 weeks after surgery, women completed a questionnaire on their recovery.

Richardson 1995 (*Continued*)

	All kept a prospective diary of their recovery for 6 weeks.
Outcomes	Operating time; analgesia required; hospital stay; recovery time and post-operative complications.
Notes	UK. Royal Free Hospital, London. Funding not reported.

Risk of bias

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Random numbers table
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported
Free of other bias?	Yes	

Schutz 2002

Methods	Duration: August 1995 - December 1997 (2 years, 4 months). Randomisation: computer-generated randomisation list and concealment by telephone inquiry. Single centre study, parallel group design with no blinding. Numer of women randomised = 48, number analysed = 48. Power calculation to estimate sample size performed. No reported dropouts.
Participants	48 women with median age of 48 years. Inclusion criteria: sonographically estimated uterine weight >200g and patient has no preference for either surgical technique. Exclusion criteria: not stated.
Interventions	AH versus LH [LH(a)]. LH(a) arm: Either type I or II procedure. Type I: the laparoscopic part included coagulation and transection of the round ligament and transection of the bladder peritoneum. If the adnexa was desired, the fallopian tube and the ovarian ligament were coagulated and transected. Where salpingo-oophorectomy was needed, the infundibulo-pelvic ligament was isolated, coagulated and transected following visualisation of the ureter. Type

Schutz 2002 (*Continued*)

	II: the uterine artery was identified at its origin when branching off the internal iliac artery. The identification was made coming from either the internal umbilical ligament or the pararectal fossa. Prior to coagulation of the uterine artery, the ureter was identified and pushed medially. After coagulation, it was left to the discretion of the surgeon to transect the uterine artery. The uterus was mobilized by pulling on the transected round ligaments and no intrauterine probes were applied for mobilization of the uterus. 71.4% operations performed by attending physician, 28.6% by resident assisted by physician. AH arm: followed the standard extrafascial technique. A Balfour retractor was used and the skin incision was stapled. 40% performed by physician and 60% by resident assisted by physician. Follow up: following discharge from hospital the women received a self-administered questionnaire to evaluate their recuperation over a period of 12 months.
Outcomes	Primary outcome: length of stay in hospital. Secondary outcomes: operating time; post-operative pain; blood loss and recovery time until return to full work activity.
Notes	Germany. Friedrich Schiller University, Jena. Funding not reported

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	Computer-generated list
Allocation concealment?	Yes	Telephone inquiry
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Yes	
Free of other bias?	Unclear	More residents in training as first surgeons in AH

Seracchioli 2002

Methods	Duration: January 1997- January 2001 (4 years). Randomisation: computer-generated randomisation unknown to the surgeons. Single centre study, parallel-group design with no blinding. Number of women randomised = 122, no dropouts reported. No power calculation for sample size was reported.
Participants	122 women with a mean age of 46.3 (LH(a) group) and 47.3 (AH group). Inclusion criteria: eligible for AH due to a large uterus (>14 weeks) caused by myomas. Uterine weight >300g, determined by a pelvic examination and transvaginal ultrasonography. Exclusion criteria: uterus projecting above the transverse umbilical line and with other pelvic pathologies (prolapse, pelvic floor relaxation, stress incontinence and adnexal masses). Medical conditions that require hospital monitoring, e.g. diabetes, heart disease, if they had undergone previous abdominal surgery requiring longitudinal laparotomy or contraindications to operative laparoscopy.
Interventions	AH versus LH [LH(a)] LH(a) arm: 10 mm cannula placed in the umbilical site to introduce the laparoscope and camera. Two 5mm suprapubic access routes were inserted lateral to deep inferior epigastric arteries. A third cannula was inserted between the umbilicus and xiphoid. Round ligaments, fallopian tubes, and utero-ovarian ligaments(or infundibulopelvic ligaments if the ovaries were to be removed) were coagulated and sectioned. Uterine peritoneal fold was opened with scissors, dissecting the bladder off the lower uterine segment and cervix. Incision of the fornix, extended laterally, stopping close to uterine vessels. Uterine pedicles skeletonised, coagulated and sectioned. Parametrial tissues were coagulated and sectioned so the uterus is free to be removed vaginally. Vaginal vault was sutured vaginally with the cardinal-uterosacral ligaments. Antibiotic prophylaxis of ampicillin 2 g. All surgical procedures were performed by the same investigators under GA. Follow up: phone interviews 2 months after discharge to determine the number of days before going back to normal activities.
Outcomes	Operating time, laparoconversions, blood loss, haemoglobin drop, fever, transfusions, hospital stay and convalescence.
Notes	Italy. S Orsola Hospital, University of Bologna. Funding not reported.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	Computer generated
Allocation concealment?	Unclear	Allocation reported as "unknown to surgeons"

Seracchioli 2002 (*Continued*)

Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported
Free of other bias?	Yes	

Silva Filho 2006

Methods	Duration: July 2004-January 2005 (6 months). Randomisation: not reported. Parallel group design. Blinding: not reported. Number of women randomised = 60. There were no dropouts. There were no conversions to AH in the VH group. The return rate of the questionnaires at one month was 100%. No power calculation was performed for sample size. Analysis was by intention to treat.
Participants	60 women. Mean age 45 years in both groups. Inclusion criteria: women with myoma and uterine size < 300cm^3. Exclusion criteria: uterine prolapse, need for associated procedures, suspicion of extrauterine disease.
Interventions	VH and TAH. Procedures were performed according to the modified Richardson's and Heaney's technique. Bissection and morcellation if needed in VH. Both groups received prophylactic antibiotic treatment (cefalotin 1 g IV) and anticoagulant therapy. Epidural anaesthesia for both VH and TAH. Surgeon experience: surgeons reported as experienced in both procedures. women were followed up until one month after surgery.
Outcomes	Primary outcome: quality of life (questionnaire SF-36). Secondary outcomes: operative time; conversions to AH; hospital stay.
Notes	Brazil. It is unclear from which hospital(s) the women were recruited. Funding not reported. The sub scales and score ranges of the questionnaire SF-36 are not in agreement with the international standard.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Unclear	Not reported

Silva Filho 2006 (*Continued*)

Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding of patients not reported. The interviewer at 1 month after surgery was blinded
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Yes	
Free of other bias?	Unclear	The sub scales and score ranges of the questionnaire SF-36 not in agreement with the international standard

Soriano 2001

Methods	Duration: January 1999 - December 1999 (1 year). Randomisation: pre-determined computer-generated randomization code. Single centre study, parallel-group design with no blinding. Number of women randomised = 80, number analysed = 80. Power calculation to estimate sample size performed. Assumed that the incidence of complications in patients undergoing LH(a) is 10% and there will be an increase of complication rate to 40%, with alpha (type I error) of 0.05 and beta (type II error) of 0.2. It was planned to recruit at least 35 women to each arm. No reported dropouts.
Participants	80 women with a mean age of 49 years. Inclusion criteria: women referred for hysterectomy due to benign pathology. Uterine size larger than 280g and one or more of the following: previous pelvic surgery, history of pelvic inflammatory disease, moderate or severe endometriosis, concomitant adnexal masses, or indication for adnexectomy. Exclusion criteria: suspicious adnexal mass, anaesthetic contra-indications for laparoscopic surgery. Women with contra-indications to acetaminophen, or to nonsteroidal antiinflammatory drugs and those whose pain evaluation was judged unreliable due to neurological disease, or treatment by steroids, NSAIDs or opoid's prior to surgery.
Interventions	VH versus LH [LH(a)]. LH(a) arm (LH type IV): after induction of pneumoperitoneum and insertion of the video laparoscope, three suprapubic trocars were introduced for the ancillary instruments. The pelvis and the upper abdomen were evaluated and endo metric lesions, adhesion or ovarian cysts, when present were treated. When the ovaries were to be conserved, bipolar forceps and scissors were used to resect the round ligament and the uteroovarian ligaments with the fallopian tubes. For adnexectomy, bipolar forceps and scissors were used to resect the round and infundibulopelvic ligaments, mesosalpinx and mesovarium. The laparoscopy included opening the bladder flap and bladder dissection, coagulating and transecting the uterosacral ligaments, base of cardinal ligaments and uterine vessels. Laparoscopic haemostasis was achieved using exclusively bipolar electrocoagulation. The

Soriano 2001 (*Continued*)

	vaginal phases included only circular incision of the vagina and wedge morcellation, coring or bivalving was performed. Peritoneal closure and closure of the vaginal vault concluded the vaginal phase. VH arm - performed using the modified Heaney procedure. When necessary, wedge morcellation, coring, or bivalving was performed. Surgeon experience: not reported. Prophylactic antibiotic (cefazoline 2 gm IV and low molecular heparin the evening before the operation. Follow up: until women were discharged from hospital.
Outcomes	Uterine weight; operative time; haemoglobin drop; post-operative complications; blood loss; pain relief and hospital stay.
Notes	France. Hopital Hotel-Dieu, Paris. Funding not reported.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	Computer-generated randomisation code
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Yes	
Free of other bias?	Yes	

Summitt 1992

Methods	Duration: June 1991 - February 1992 (9 months). Randomisation: computer-generated randomisation numbers. Single centre study, parallel-group design with no blinding. Number of women randomised = 56, number analysed = 56. One operation was unsuccessful therefore for certain outcomes only 55 were analysed. No power calculation for sample size was reported. Analysis not by intention to treat (Conversion excluded from analysis).
Participants	56 women with a mean age of 38 years. Inclusion criteria: 1) age 18-65 years; 2) no significant medical illness that required prolonged post-operative monitoring or care; 3) a telephone in working order; 4) a

Summitt 1992 (*Continued*)

	support person who could assist the patient for the first 48 hours after surgery and 5) an understanding of all post-operative instructions. Criteria for VH: 1) uterine size no larger than 16 gestational weeks; 2) the presence of uterine mobility; 3) a pubic arch of at least 90 degrees. Factors that did not influence the decision to proceed vaginally include: 1) a preoperative diagnosis of pelvic pain; 2) the need for oophorectomy, or 3) a history of previous pelvic surgery. Exclusion criteria: 1) A concomitant anterior or posterior colporrhaphy was required; 2) cervical conization was performed within the previous 48 hours; and 3) additional antibiotic prophylaxis was required for valvular heart disease. They were also excluded if they had absolute contraindications to laparoscopy, such as 1) any condition that could not tolerate anaesthesia, 2) severe bleeding disorder, 3) acute peritonitis of the upper abdomen and uterine myomata or 4) a pelvic mass larger than 16 gestational weeks in size.
Interventions	VH versus LH [LH(a)]. LH(a) arm: Three 12-mm trocars were used, one placed infra-umbilically and one placed in each lower quadrant approx. 6-8cm above the pubic rami, lateral to the inferior epigastric arteries. A Hulka tenaculum was used to manipulate the uterus. The bladder flap was developed by incising the vesicouterine fold of peritoneum and dissecting the bladder below the cervix. The ureters were then identified and mobilized using linear incisions in the medial leaf of the broad ligament, midway between the uterosacral ligaments and infundibulopelvic vessels. The Multifire EndoGIA disposable surgical stapler was used to staple-ligate and cut all uterine pedicles, each consisting of the round ligament, fallopian tubes, and utero-ovarian ligament, were cut. If the ovaries were to be removed, the stapler was instead placed outside the tube and ovary, encompassing the infundibulopelvic ligament. The uterine arteries were next staple-ligated and cut bilaterally. If possible, the stapling device was also used to ligate and cut the cardinal ligaments. Otherwise, stapling of uterine pedicles ended and the anterior vaginal fornix was entered with unipolar cautery, incising over a moistened sponge distending the anterior vagina. The remainder of the hysterectomy was completed vaginally. Performed by a team of 3 surgeons (2 attending faculty and a senior gynaecology resident) . VH arm: anaesthesiologist's choice of general or regional anaesthesia. A modified Heaney technique was performed using O-coated polyglycolic acid suture for all pedicles. The vaginal cuff was closed in all cases. Performed by a gynaecology resident with attending faculty member. All received pre-operative antibiotic prophylaxis (cefazolin 2 gm) intravenously. If allergic to penicillin, 200 mg dose of doxycycline intravenously was used. Post-operative follow up consisted of a telephone call by the attending surgeon on the evening of surgery and the first 2 post-operative days. Patients were then seen 1 and 6 weeks post-operatively in the outpatient clinic.
Outcomes	Operating time, blood loss, anaesthesia time, intra-operative complications, febrile morbidity, pain relief and costs.
Notes	USA. Gynecology clinic, University of Tennessee, Memphis. Funding not reported.

Summitt 1992 (*Continued*)

Risk of bias		
Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	Computer-generated numbers
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	No blinding
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported
Free of other bias?	No	No intention-to-treat analysis Different surgeons performed different procedures. More residents as first surgeons in VH

Summitt 1998

Methods	Duration: not reported. Randomisation: computer-generated randomisation list. Each surgical assignment placed in consecutive sealed envelopes and opened by an independent person (study secretary) . Multicentre study (n=3), parallel-group design with no blinding. Number of women randomised = 67, number analysed = 65. 2 women who were randomised refused their assigned procedure and they were removed from the study and their random numbers discarded. Power calculation to estimate sample size was not reported. Analysis said to be by intention to treat, but 2 randomised women were not analysed.
Participants	65 women with a mean age of 38.3 (LH(a) group) and 41.5 (AH group). Inclusion criteria: Scheduled for AH for benign diseases. Indications for AH: 1) documented visual diagnosis of pelvic endometriosis; 2) documented pelvic adhesions; 3) three or more previous laparotomies; 4) uterine leimyomata 12-18 gestational weeks in size; 5) previous tuboovarian abscess or two documented episodes of pelvic inflammatory disease requiring IV antibiotic therapy; 6) adnexal mass in the presence of an indication for hysterectomy; and 7) indicated hysterectomy with lack of mobility and unfavourable vaginal introitus. The following inclusion criteria were met: 1) age at least 18 years, 2) a working telephone in the home, 3) an available support person in the home for 48 hours after surgery, and 4) an understanding of the postoperative instructions. Exclusion criteria: concomitant colporrhaphy, urethropexy, vaginal vault suspension, or a non-gynaecologic major operation required. Medical conditions requiring in-hospital monitoring or if they had known cervical or endometrial cancer. Candidates were also

Summitt 1998 (*Continued*)

	excluded if they had absolute contraindications to operative laparoscopy, including: 1) uterine leiomyomas or pelvic masses greater than 18 gestational weeks in size, 2) conditions making them intolerant to anaesthesia, 3) severe bleeding disorders, 4) acute periodontitis of the upper abdomen with severe distension, or 5) a midline abdominal hernia.
Interventions	AH versus LH [LH(a)]. LH(a) arm: Three 12-mm trocars were used, one placed infra umbilically and one placed in each lower quadrant approx. 6-8 cm above the pubic rami, lateral to the inferior epigastric arteries. A Hulka tenaculum was used to manipulate the uterus. The bladder flap was developed by incising the vesicouterine fold of peritoneum and dissecting the bladder below the cervix. The ureters were then identified and mobilized using linear incisions in the medial leaf of the broad ligament, midway between the uterosacral ligaments and infundibulopelvic vessels. The Multifire EndoGIA disposable surgical stapler was used to staple-ligate and cut all uterine pedicles, each consisting of the round ligament, fallopian tubes, and utero-ovarian ligament, were cut. If the ovaries were to be removed, the stapler was instead placed outside the tube and ovary, encompassing the infundibulopelvic ligament. The uterine arteries were next staple-ligated and cut bilaterally. If possible, the stapling device was also used to ligate and cut the cardinal ligaments. Otherwise, stapling of uterine pedicles ended and the anterior vaginal fornix was entered with unipolar cautery, incising over a moistened sponge distending the anterior vagina. The remainder of the hysterectomy was completed vaginally. AH arm: modified Richardson technique. Surgeon experience: not reported. All received pre-operative antibiotic prophylaxis (cefazolin 2 gm) intravenously. If allergic to penicillin, 200 mg dose of doxycycline intravenously was used. Follow up: 2 and 6 weeks post-operatively in the outpatient office.
Outcomes	Operating time; blood loss; intra-operative and post-operative complications; hospital stay; febrile morbidity; requirement for analgesia; recovery time; conversion to abdominal hysterectomy and costs.
Notes	USA. University of Tennessee, Memphis; Bowman Gray School of medicine, Winston-Salem, North Carolina; University of North Carolina, Chapel Hill. Funding: US Surgical Corporation, Norwalk, Connecticut USA.

Risk of bias

Item	**Authors' judgement**	**Description**
Adequate sequence generation?	Yes	Computer-generated
Allocation concealment?	Yes	Sealed opaque envelopes
Blinding? All outcomes	No	No blinding

Summitt 1998 (*Continued*)

Incomplete outcome data addressed? All outcomes	No	2 women refused assigned procedure and were excluded from analysis
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported
Free of other bias?	No	Analysis not according to intention to treat Funding from pharmaceutical or surgical instrumentation company

Tsai 2003

Methods	Duration: August 1997 to March 1999 (1 year, 6 months). Randomisation: computer-generated random number sequence. Single centre study, parallel-group design with no blinding. Number of women randomised = 200, number analysed = 200. Not analysed on intention to treat basis - two LAVHs converted to AH analysed as AH. No power calculation for sample size reported.
Participants	200 women with a mean age of 46.9 years (AH) and 46.7 years (LAVH). Inclusion criteria: good mobility of an enlarged uterus on bimanual pelvic examination. Exclusion criteria: upper uterine margin higher than midpoint between symphysis pubis and umbilicus; pre-existing cardiopulmonary dysfunction or poorly controlled systemic disease; cervical malignancy on colposcopy; indication for conventional VH.
Interventions	AH versus LH [LAVH]. AH technique not specified. LAVH technique under GA as follows. Uterine manipulator applied and pneumoperitoneum established. Two trocar puncture sites, 12 mm umbilically and 2 mm right lower quadrant. 2 mm minilaparoscope allowed inspection and treatment of endometriosis lesions or adhesions through umbilical port. Multifire EndoGIA stapler resection of round and utero-ovarian ligaments (or bipolar forceps applied to round ligaments if large myoma present). Vaginal phase included insertion of 10mm laparoscope after division of the vesicouterine fold and peritoneal entry (the LETS technique). Then standard VH technique, including clamping, transection and suture ligation of uterosacral, cardinal and uterine pedicles, followed by peritoneal closure, then laparoscopic re-evaluation and lavage after haemostasis if necessary. Antibiotic and thrombo prophylaxis not specified. Follow-up duration not specified.
Outcomes	Operating time; complications; duration of hospital stay.
Notes	Taiwan. University and municipal hospital in Kaohsuing. Funding not reported.

Risk of bias

Tsai 2003 (*Continued*)

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Computer generated
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	Yes	No dropouts
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported.
Free of other bias?	No	Analysis not according to intention to treat (with two conversions from LH to AH)

Yuen 1998

Methods	Duration: January 1996 - June 1996 (6 months). Randomisation: computer-generated sequence of random numbers. Single centre study, parallel-group design with no blinding. Number of women randomised = 50, number analysed = 44. 4 declined the operation and 2 refused to participate postoperatively. No power calculation for sample size or analysis by intention to treat was reported.
Participants	44 women with a median age of 44 (LH(a) group) and 43 (AH group). Inclusion criteria: no major medical diseases requiring hysterectomy for benign disorders. Exclusion criteria: suitable for VH or a uterus larger than 16 weeks' gravid size.
Interventions	AH versus LH [LH(a)]. LH(a) arm: performed with the use of three ports and bipolar desiccation for hemostasis. The laparoscopic part of the operation stopped after securing the uterine arteries, and the remainder of the operation was performed vaginally. AH arm: Performed in the standard manner through a Pfannenstiel or lower midline incision. Surgeon experience: not reported. Follow up: until discharge from hospital.
Outcomes	Operation time; blood loss; post-operative stay and post-operative complications.
Notes	Hong Kong. Chinese University. Funding: direct grant for research from the Chinese University of Hong Kong.
Risk of bias	

Yuen 1998 (*Continued*)

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	Computer generated
Allocation concealment?	Unclear	Not reported
Blinding? All outcomes	No	Blinding not reported
Incomplete outcome data addressed? All outcomes	No	6 dropouts were not analysed (4 declined the operation and 2 refused to participate postoperatively)
Free of selective reporting?	Unclear	Primary outcome not defined, and no power calculation reported
Free of other bias?	Yes	

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Aka 2004	Randomised trial comparing AH without colporrhaphy versus VH with colporrhaphy (n=30). The complication profile for hysterectomy with colporrhaphy is different to hysterectomy without colporrhaphy . Inclusion of this trial and pooling for meta-analysis would introduce undue clinical heterogeneity. Operation time was longer and hospital stay shorter in VH with colporrhaphy, compared with AH.
Apoola 1998	Non-randomised comparison of VH and AH for women with moderately enlarged uterus. Women undergoing VH had less blood loss, a smaller haemoglobin drop and a shorter hospital stay.
Atabekoglu 2004	Randomised trial of LAVH versus AH (n=46), but did not measure any of our pre-specified outcome measures, focusing on tissue trauma (laboratory findings). Lower CRP and CPK were found after LAVH.
Chapron 1999	Not a randomised controlled study. Study to assess hysterectomy techniques and the rate of total laparoscopic hysterectomy (TLH).
Cucinella 2000	women included in other trial.
Davies 1998	No further data provided by author.
Demir 2008	Randomised trial of LH(a) (n=15) versus TLH (n=15) versus AH (n=15) mainly focusing on tissue trauma by measuring IL-6 and CRP. Lower values for both tissue trauma parameters were observed in LH(a) and TLH compared to AH 24 hours post-operation.

(*Continued*)

Ellstrom 2003	Randomised trial of TLH versus AH (n=74), but did not measure any of our pre-specified outcome measures, focusing on psychological well being. No differences were found.
Hahlin 1994	women included in other trial.
Holub 2000	Randomised controlled trial (n=70) but compared two variants of LAVH (described in the study as LAVH and VALH [vaginally assisted laparoscopic hysterectomy] respectively), rather than comparing LAVH with another surgical approach. In LAVH, the round ligament, upper broad ligament, infundibulopelvic or uteroovarian ligament, bladder pillars in preparation of the bladder flap were taken laparoscopically; the uterine vessels, cardinal-uterosacral ligaments, anterior and posterior culdotomy and vaginal cuff closure were taken vaginally. In VALH, all steps were performed laparoscopically, other than taking the uterine vessels and vaginal cuff closure which were performed vaginally. Operation time shorter for VALH (mean 81.33 versus 89.47 mins, p=0.01), with no other significant differences in outcomes reported.
Horng 2004	Randomised controlled trial (n=541) but compared two variants of colpotomy in LAVH (vaginal and laparoscopic approach), rather than comparing LAVH with another surgical approach. The vaginal approach was associated with significantly less urinary tract injuries as compared with the laparoscopic approach (9/274 and 1/267 respectively).
Howard 1993	Not a randomised controlled study. Allocated to study groups based on the attending physician scheduled for the case. Intervention: laparoscopic hysterectomy (LH) versus abdominal hysterectomy (AH).
Long 2005	Randomised controlled trial (n=68) but compared two variants of LH(a) (with and without vaginal cuff suspension), rather than comparing LH(a) with another surgical approach. Less mobility of the bladder neck was found on ultrasound in LH(a) with suspension.
Møller 2001	Not a randomised controlled study, allocated to study groups by the attending gynecologist in a non-randomised manner. Intervention: laparoscopic hysterectomy (LH) versus abdominal hysterectomy (AH).
Nezhat 1992	Not a randomised controlled study, alternatively assigned to study groups. Intervention: laparoscopic hysterectomy (LH) versus abdominal hysterectomy (AH).
Oscarsson 2006	Randomised trial comparing subtotal AH versus subtotal LH (n=47). The complication profile for subtotal hysterectomy is different to total hysterectomy. Inclusion of this trial and pooling for meta-analysis would introduce undue clinical heterogeneity. ASH was performed by Pfannenstiel incision and excision of the uterus in the cervical isthmus region after dissection of the uterine arteries. LSH were performed by a 3 port technique. Adnexal pedicles were dissected with bipolar coagulation and unipolar scissors. Uterine arteries were exposed prior to unipolar uterine dissection. Morcellation of the uterus with 20mm automatic morcellator. Bipolar coagulation of the endocervical mucosa. Primary outcome: hospital stay. Secondary outcomes: operation time, complications according to patient and physician, pain, pain medication, Foley catheter removal, return to fluid and food intake, return to normal activities and work, patient satisfaction. Operation time was longer for subtotal LH, intra-operative blood loss was higher for subtotal AH, VAS pain was higher for subtotal AH at 6 hours after surgery, return to work was sooner after subtotal LH. Other comparisons were not different.
Pabuccu 1996	No further data provided by author.
Park 2003	Not a randomised controlled study. Historical comparison of LAVH and TLH.

(*Continued*)

Petrucco 1999	No further data provided by author.
Phipps 1993	Not a truly randomised controlled study, allocated to study groups according to the last digit of their hospital record number by secretarial staff. Intervention: laparoscopic hysterectomy (LH) with bilateral salpingo-oophorectomy (BSO) versus abdominal hysterectomy (AH) with BSO.

Characteristics of ongoing studies *[ordered by study ID]*

Kluivers 2007a

Trial name or title	Pelvic organ function
Methods	Questionnaires UDI, DDI and IIQ at 4 years after surgery
Participants	Women with benign disease
Interventions	TLH versus AH
Outcomes	Not yet known
Starting date	2002
Contact information	K.Kuivers@obgyn.umcn.nl
Notes	Previous publication on women with benign and malignant disease will be broken down for indications at 4-year follow up

DATA AND ANALYSES

Comparison 1. VH versus AH

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Return to normal activities (days)	3	176	Mean Difference (IV, Fixed, 95% CI)	-9.47 [-12.57, -6.37]
2 Long term outcomes: satisfaction (dich)	1	119	Odds Ratio (M-H, Fixed, 95% CI)	2.69 [0.50, 14.42]
3 Long term outcomes: quality of life (descriptive data)			Other data	No numeric data
4 Intraoperative visceral injury (dich)	3		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
4.1 Bladder injury	3	239	Odds Ratio (M-H, Fixed, 95% CI)	3.11 [0.31, 30.90]
4.2 Ureter injury	1	119	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
4.3 Urinary tract (bladder or ureter) injury	3	239	Odds Ratio (M-H, Fixed, 95% CI)	3.11 [0.31, 30.90]
4.4 Bowel injury	1	119	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
4.5 Vascular injury	1	119	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
5 Long term complications (dich)	1		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 Urinary dysfunction	1	80	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
6 Operation time (mins)	3		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
7 Operation time (descriptive data)			Other data	No numeric data
8 Other intraoperative complications: estimated blood loss (cont)	2	140	Mean Difference (IV, Fixed, 95% CI)	-11.93 [-70.70, 46.84]
9 Other intraoperative complications: estimated blood loss (descriptive data)			Other data	No numeric data
10 Short term outcomes (cont)	4		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
10.1 Transfusion	4	295	Odds Ratio (M-H, Fixed, 95% CI)	1.31 [0.46, 3.72]
10.2 Pelvic hematoma	3	235	Odds Ratio (M-H, Fixed, 95% CI)	0.99 [0.28, 3.53]
10.3 Vaginal cuff infection	2	140	Odds Ratio (M-H, Fixed, 95% CI)	3.08 [0.12, 77.80]
10.4 Wound/ abdominal wall infection	2	155	Odds Ratio (M-H, Fixed, 95% CI)	0.24 [0.03, 2.18]
10.5 UTI	3	176	Odds Ratio (M-H, Fixed, 95% CI)	0.59 [0.08, 4.61]
10.6 Chest infection	1	60	Odds Ratio (M-H, Fixed, 95% CI)	1.0 [0.13, 7.60]
10.7 Febrile episodes or unspecified infection	4	295	Odds Ratio (M-H, Fixed, 95% CI)	0.42 [0.21, 0.83]
10.8 Thrombo-embolism	1	119	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
11 Short term outcomes (descriptive data)			Other data	No numeric data
11.1 Change in haemoglobin			Other data	No numeric data
12 Short term outcome: pain relief (descriptive data)			Other data	No numeric data
13 Length of hospital stay (days)	4	295	Mean Difference (IV, Fixed, 95% CI)	-1.07 [-1.22, -0.92]

14 Length of hospital stay (descriptive data)	Other data	No numeric data

Comparison 2. LH versus AH

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Return to normal activities (days)	6	520	Mean Difference (IV, Fixed, 95% CI)	-13.63 [-15.42, -11.84]
2 Return to normal activities (descriptive data)			Other data	No numeric data
3 Long term outcomes: satisfaction (dich)	1	166	Odds Ratio (M-H, Fixed, 95% CI)	0.65 [0.32, 1.30]
4 Long term outcomes: quality of life (descriptive data)			Other data	No numeric data
5 Intraoperative visceral injury (dich)	15		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 Bladder injury	11	1988	Odds Ratio (M-H, Fixed, 95% CI)	1.83 [0.87, 3.87]
5.2 Ureter injury	5	1327	Odds Ratio (M-H, Fixed, 95% CI)	3.46 [0.94, 12.71]
5.3 Urinary tract (bladder or ureter) injury	12	2090	Odds Ratio (M-H, Fixed, 95% CI)	2.41 [1.21, 4.82]
5.4 Bowel injury	3	1125	Odds Ratio (M-H, Fixed, 95% CI)	0.17 [0.02, 1.60]
5.5 Vascular injury	2	956	Odds Ratio (M-H, Fixed, 95% CI)	1.76 [0.52, 5.87]
5.6 Bleeding	5	1266	Odds Ratio (M-H, Fixed, 95% CI)	0.38 [0.12, 1.19]
6 Long term complications (dich)	4		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
6.1 Fistula	2	245	Odds Ratio (M-H, Fixed, 95% CI)	3.07 [0.32, 29.96]
6.2 Urinary dysfunction	2	246	Odds Ratio (M-H, Fixed, 95% CI)	0.94 [0.48, 1.84]
7 Operation time (mins)	11	1047	Mean Difference (IV, Random, 95% CI)	20.27 [3.95, 36.59]
7.1 LAVH versus AH	4	466	Mean Difference (IV, Random, 95% CI)	0.27 [-23.39, 23.93]
7.2 LH(a) versus AH	5	420	Mean Difference (IV, Random, 95% CI)	33.45 [14.82, 52.08]
7.3 TLH versus AH	2	161	Mean Difference (IV, Random, 95% CI)	28.74 [2.64, 54.85]
8 Operation time (descriptive data)			Other data	No numeric data
9 Other intraoperative complications: estimated blood loss	7	693	Mean Difference (IV, Fixed, 95% CI)	-45.26 [-72.68, -17.85]
10 Other intraoperative complications: change in Hb	3	288	Mean Difference (IV, Fixed, 95% CI)	-0.55 [-0.82, -0.28]
11 Other intraoperative complications (descriptive data)			Other data	No numeric data
11.1 Estimated blood loss (ml)			Other data	No numeric data
11.2 Change in Hb			Other data	No numeric data
12 Short term outcomes (dich)	21		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
12.1 Transfusion	16	2305	Odds Ratio (M-H, Fixed, 95% CI)	0.78 [0.51, 1.19]
12.2 Pelvic haematoma	7	682	Odds Ratio (M-H, Fixed, 95% CI)	0.79 [0.40, 1.56]
12.3 Vaginal cuff infection	9	852	Odds Ratio (M-H, Fixed, 95% CI)	1.43 [0.67, 3.04]

12.4 Wound/abdominal wall infection	6	530	Odds Ratio (M-H, Fixed, 95% CI)	0.31 [0.12, 0.77]
12.5 UTI	7	609	Odds Ratio (M-H, Fixed, 95% CI)	0.98 [0.50, 1.92]
12.6 Chest infection	3	294	Odds Ratio (M-H, Fixed, 95% CI)	0.31 [0.07, 1.35]
12.7 Febrile episodes or unspecified infection	15	2138	Odds Ratio (M-H, Fixed, 95% CI)	0.67 [0.51, 0.88]
12.8 Thrombo-embolism	3	1125	Odds Ratio (M-H, Fixed, 95% CI)	0.89 [0.23, 3.39]
12.9 Wound dehiscence	1	81	Odds Ratio (M-H, Fixed, 95% CI)	3.15 [0.12, 79.69]
13 Pain relief (descriptive data)			Other data	No numeric data
13.1 Pain scales			Other data	No numeric data
13.2 Postoperative analgesics			Other data	No numeric data
13.3 Recovery from pain (days)			Other data	No numeric data
14 Length of hospital stay (days)	10	1007	Mean Difference (IV, Fixed, 95% CI)	-2.01 [-2.17, -1.86]
15 Length of hospital stay (descriptive data)			Other data	No numeric data
16 Cost (descriptive data)			Other data	No numeric data

Comparison 3. LH subcategory analyses versus AH

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Return to normal activities (days)	6	520	Mean Difference (IV, Fixed, 95% CI)	-13.63 [-15.42, -11.84]
1.1 LAVH versus AH	1	80	Mean Difference (IV, Fixed, 95% CI)	-8.40 [-12.15, -4.65]
1.2 LH(a) versus AH	5	440	Mean Difference (IV, Fixed, 95% CI)	-15.17 [-17.21, -13.14]
1.3 TLH versus AH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.4 Non-categorisable LH versus AH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
2 Satisfaction	1	166	Odds Ratio (M-H, Fixed, 95% CI)	0.65 [0.32, 1.30]
2.1 LAVH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
2.2 LH(a) versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
2.3 TLH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
2.4 Non-categorisable LH versus AH	1	166	Odds Ratio (M-H, Fixed, 95% CI)	0.65 [0.32, 1.30]
3 Bladder injury	12	1982	Odds Ratio (M-H, Fixed, 95% CI)	1.81 [0.86, 3.82]
3.1 LAVH versus AH	3	396	Odds Ratio (M-H, Fixed, 95% CI)	1.0 [0.14, 7.17]
3.2 LH(a) versus AH	4	419	Odds Ratio (M-H, Fixed, 95% CI)	1.93 [0.48, 7.87]
3.3 TLH versus AH	3	101	Odds Ratio (M-H, Fixed, 95% CI)	0.58 [0.05, 6.73]
3.4 Non-categorisable LH versus AH	2	1066	Odds Ratio (M-H, Fixed, 95% CI)	2.59 [0.81, 8.32]
4 Ureter injury	6	1367	Odds Ratio (M-H, Fixed, 95% CI)	3.46 [0.94, 12.71]
4.1 LAVH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
4.2 LH(a) versus AH	1	100	Odds Ratio (M-H, Fixed, 95% CI)	6.12 [0.29, 130.87]
4.3 TLH versus AH	3	201	Odds Ratio (M-H, Fixed, 95% CI)	3.35 [0.34, 32.97]
4.4 Non-categorisable LH versus AH	2	1066	Odds Ratio (M-H, Fixed, 95% CI)	2.82 [0.44, 18.03]

5 Bowel injury	3	1125	Odds Ratio (M-H, Fixed, 95% CI)	0.17 [0.02, 1.60]
5.1 LAVH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
5.2 LH(a) versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
5.3 TLH versus AH	1	59	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
5.4 Non-categorisable LH versus AH	2	1066	Odds Ratio (M-H, Fixed, 95% CI)	0.17 [0.02, 1.60]
6 Urinary tract (bladder or ureter) injury	10	1850	Odds Ratio (M-H, Fixed, 95% CI)	2.72 [1.31, 5.63]
6.1 LAVH versus AH	2	196	Odds Ratio (M-H, Fixed, 95% CI)	3.05 [0.12, 76.48]
6.2 LH(a) versus AH	4	427	Odds Ratio (M-H, Fixed, 95% CI)	2.79 [0.73, 10.68]
6.3 TLH versus AH	2	161	Odds Ratio (M-H, Fixed, 95% CI)	1.61 [0.30, 8.63]
6.4 Non-categorisable LH versus AH	2	1066	Odds Ratio (M-H, Fixed, 95% CI)	3.13 [1.06, 9.28]
7 Vascular injury	2	956	Odds Ratio (M-H, Fixed, 95% CI)	1.76 [0.52, 5.87]
7.1 LAVH versus AH	1	80	Odds Ratio (M-H, Fixed, 95% CI)	5.26 [0.24, 113.11]
7.2 LH(a) versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
7.3 TLH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
7.4 Non-categorisable LH versus AH	1	876	Odds Ratio (M-H, Fixed, 95% CI)	1.34 [0.35, 5.08]
8 Fistula	2	245	Odds Ratio (M-H, Fixed, 95% CI)	3.07 [0.32, 29.96]
8.1 LAVH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
8.2 LH(a) versus AH	1	143	Odds Ratio (M-H, Fixed, 95% CI)	3.09 [0.12, 77.01]
8.3 TLH versus AH	1	102	Odds Ratio (M-H, Fixed, 95% CI)	3.06 [0.12, 76.88]
8.4 Non-categorisable LH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
9 Urinary dysfunction	2	246	Odds Ratio (M-H, Fixed, 95% CI)	0.94 [0.48, 1.84]
9.1 LAVH versus AH	1	80	Odds Ratio (M-H, Fixed, 95% CI)	3.08 [0.12, 77.80]
9.2 LH(a) versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
9.3 TLH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
9.4 Non-categorisable LH versus AH	1	166	Odds Ratio (M-H, Fixed, 95% CI)	0.88 [0.44, 1.76]
10 Bleeding	4	1185	Odds Ratio (M-H, Fixed, 95% CI)	0.39 [0.12, 1.31]
10.1 LAVH versus AH	1	116	Odds Ratio (M-H, Fixed, 95% CI)	0.33 [0.01, 8.21]
10.2 LH(a) versus AH	2	193	Odds Ratio (M-H, Fixed, 95% CI)	0.16 [0.02, 1.34]
10.3 TLH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
10.4 Non-categorisable LH versus AH	1	876	Odds Ratio (M-H, Fixed, 95% CI)	1.50 [0.16, 14.51]
11 Transfusion	15	2224	Odds Ratio (M-H, Fixed, 95% CI)	0.79 [0.52, 1.22]
11.1 LAVH versus AH	4	458	Odds Ratio (M-H, Fixed, 95% CI)	0.37 [0.10, 1.40]
11.2 LH(a) versus AH	8	641	Odds Ratio (M-H, Fixed, 95% CI)	0.50 [0.26, 0.95]
11.3 TLH versus AH	1	59	Odds Ratio (M-H, Fixed, 95% CI)	0.22 [0.01, 4.83]
11.4 Non-categorisable LH versus AH	2	1066	Odds Ratio (M-H, Fixed, 95% CI)	2.14 [0.95, 4.81]
12 Pelvic haematoma	7	682	Odds Ratio (M-H, Fixed, 95% CI)	0.79 [0.40, 1.56]
12.1 LAVH versus AH	3	276	Odds Ratio (M-H, Fixed, 95% CI)	0.33 [0.05, 2.10]
12.2 LH(a) versus AH	4	406	Odds Ratio (M-H, Fixed, 95% CI)	0.93 [0.44, 1.97]
12.3 TLH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
12.4 Non-categorisable LH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
13 Vaginal cuff infection	9	852	Odds Ratio (M-H, Fixed, 95% CI)	1.43 [0.67, 3.04]
13.1 LAVH versus AH	3	396	Odds Ratio (M-H, Fixed, 95% CI)	0.75 [0.17, 3.37]
13.2 LH(a) versus AH	6	456	Odds Ratio (M-H, Fixed, 95% CI)	1.79 [0.73, 4.37]

13.3 TLH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
13.4 Non-categorisable LH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
14 Wound/abdominal wall infection	5	449	Odds Ratio (M-H, Fixed, 95% CI)	0.32 [0.12, 0.85]
14.1 LAVH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
14.2 LH(a) versus AH	4	259	Odds Ratio (M-H, Fixed, 95% CI)	0.35 [0.12, 1.03]
14.3 TLH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
14.4 Non-categorisable LH versus AH	1	190	Odds Ratio (M-H, Fixed, 95% CI)	0.24 [0.03, 2.21]
15 Urinary tract infection	7	609	Odds Ratio (M-H, Fixed, 95% CI)	0.98 [0.50, 1.92]
15.1 LAVH versus AH	1	80	Odds Ratio (M-H, Fixed, 95% CI)	0.33 [0.01, 8.22]
15.2 LH(a) versus AH	5	339	Odds Ratio (M-H, Fixed, 95% CI)	1.27 [0.55, 2.95]
15.3 TLH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
15.4 Non-categorisable LH versus AH	1	190	Odds Ratio (M-H, Fixed, 95% CI)	0.65 [0.18, 2.39]
16 Chest infection	3	294	Odds Ratio (M-H, Fixed, 95% CI)	0.31 [0.07, 1.35]
16.1 LAVH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
16.2 LH(a) versus AH	2	104	Odds Ratio (M-H, Fixed, 95% CI)	0.63 [0.10, 3.93]
16.3 TLH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
16.4 Non-categorisable LH versus AH	1	190	Odds Ratio (M-H, Fixed, 95% CI)	0.11 [0.01, 2.01]
17 Febrile episodes or unspecified infection	14	2057	Odds Ratio (M-H, Fixed, 95% CI)	0.68 [0.52, 0.90]
17.1 LAVH versus AH	3	258	Odds Ratio (M-H, Fixed, 95% CI)	0.28 [0.09, 0.89]
17.2 LH(a) versus AH	7	572	Odds Ratio (M-H, Fixed, 95% CI)	0.55 [0.33, 0.90]
17.3 TLH versus AH	2	161	Odds Ratio (M-H, Fixed, 95% CI)	0.36 [0.11, 1.21]
17.4 Non-categorisable LH versus AH	2	1066	Odds Ratio (M-H, Fixed, 95% CI)	0.92 [0.63, 1.34]
18 Thromboembolism	3	1125	Odds Ratio (M-H, Fixed, 95% CI)	0.89 [0.23, 3.39]
18.1 LAVH versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
18.2 LH(a) versus AH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
18.3 TLH versus AH	1	59	Odds Ratio (M-H, Fixed, 95% CI)	0.38 [0.01, 9.76]
18.4 Non-categorisable LH versus AH	2	1066	Odds Ratio (M-H, Fixed, 95% CI)	1.11 [0.24, 5.13]
19 Estimated blood loss	7	693	Mean Difference (IV, Fixed, 95% CI)	-45.26 [-72.68, -17.85]
19.1 LAVH versus AH	3	396	Mean Difference (IV, Fixed, 95% CI)	-33.08 [-68.27, 2.11]
19.2 LH(a) versus AH	4	297	Mean Difference (IV, Fixed, 95% CI)	-64.08 [-107.82, -20.35]
19.3 TLH versus AH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
19.4 Non-categorisable LH versus AH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
20 Drop in haemoglobin	3	288	Mean Difference (IV, Fixed, 95% CI)	-0.55 [-0.82, -0.28]
20.1 LAVH versus AH	1	116	Mean Difference (IV, Fixed, 95% CI)	-0.46 [-0.83, -0.09]
20.2 LH(a) versus AH	2	172	Mean Difference (IV, Fixed, 95% CI)	-0.66 [-1.05, -0.27]
20.3 TLH versus AH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
20.4 Non-categorisable LH versus AH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
21 Length of hospital stay (days)	10	1007	Mean Difference (IV, Fixed, 95% CI)	-2.01 [-2.17, -1.86]

21.1 LAVH versus AH	4	466	Mean Difference (IV, Fixed, 95% CI)	-2.13 [-2.37, -1.90]
21.2 LH(a) versus AH	4	380	Mean Difference (IV, Fixed, 95% CI)	-1.57 [-1.81, -1.34]
21.3 TLH versus AH	2	161	Mean Difference (IV, Fixed, 95% CI)	-3.20 [-3.66, -2.74]
21.4 Non-categorisable LH versus AH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable

Comparison 4. LH versus AH subcategory analyses

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Wound/abdominal wall infection	1	81	Odds Ratio (M-H, Fixed, 95% CI)	0.20 [0.01, 4.19]
2 Febrile episodes or unspecified infection	1	81	Odds Ratio (M-H, Fixed, 95% CI)	0.14 [0.01, 2.72]
3 Unintended laparotomy	1	81	Odds Ratio (M-H, Fixed, 95% CI)	0.49 [0.08, 2.82]
4 Transfusion	1	81	Odds Ratio (M-H, Fixed, 95% CI)	0.33 [0.01, 8.43]
5 Wound dehiscence	1	81	Odds Ratio (M-H, Fixed, 95% CI)	3.15 [0.12, 79.69]

Comparison 5. LH versus VH

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Return to normal activities (days)	2	140	Mean Difference (IV, Fixed, 95% CI)	-1.07 [-4.21, 2.06]
2 Return to normal activities (descriptive data)			Other data	No numeric data
3 Long term outcomes: quality of life (descriptive data)			Other data	No numeric data
4 Intraoperative visceral injury (dich)	9		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
4.1 Bladder injury	7	1205	Odds Ratio (M-H, Fixed, 95% CI)	1.46 [0.63, 3.35]
4.2 Ureter injury	2	904	Odds Ratio (M-H, Fixed, 95% CI)	5.64 [0.72, 44.03]
4.3 Urinary tract (bladder or ureter) injury	7	1205	Odds Ratio (M-H, Fixed, 95% CI)	2.06 [0.94, 4.54]
4.4 Bowel injury	2	904	Odds Ratio (M-H, Fixed, 95% CI)	3.02 [0.12, 74.46]
4.5 Vascular injury	4	685	Odds Ratio (M-H, Fixed, 95% CI)	1.58 [0.48, 5.27]
4.6 Bleeding	2	904	Odds Ratio (M-H, Fixed, 95% CI)	2.76 [1.02, 7.42]
4.7 Unintended laparotomy	8	1290	Odds Ratio (M-H, Fixed, 95% CI)	1.44 [0.81, 2.56]
5 Long term complications (dich)	2		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 Fistula	1	56	Odds Ratio (M-H, Fixed, 95% CI)	0.30 [0.01, 7.67]
5.2 Urinary dysfunction	1	80	Odds Ratio (M-H, Fixed, 95% CI)	3.08 [0.12, 77.80]
6 Operation time (mins)	6	741	Mean Difference (IV, Fixed, 95% CI)	39.29 [38.72, 39.86]
6.1 LAVH versus VH	2	128	Mean Difference (IV, Fixed, 95% CI)	19.37 [8.91, 29.84]
6.2 LH(a) versus VH	3	213	Mean Difference (IV, Fixed, 95% CI)	53.58 [43.67, 63.49]
6.3 TLH versus VH	1	400	Mean Difference (IV, Fixed, 95% CI)	39.30 [38.73, 39.87]

6.4 Non-categorisable LH versus VH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
7 Operation time (descriptive data)			Other data	No numeric data
8 Other intraoperative complications (cont)	5		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
8.1 Estimated blood loss (mls)	3	196	Mean Difference (IV, Fixed, 95% CI)	9.72 [-50.21, 69.65]
8.2 Change in Hb	2	157	Mean Difference (IV, Fixed, 95% CI)	0.15 [-0.26, 0.56]
9 Other intraoperative complications (descriptive data)			Other data	No numeric data
9.1 Estimated blood loss (ml)			Other data	No numeric data
9.2 Change in Hb			Other data	No numeric data
10 Short term outcomes (dich)	8		Odds Ratio (M-H, Fixed, 95% CI)	Subtotals only
10.1 Transfusion	7	1249	Odds Ratio (M-H, Fixed, 95% CI)	2.07 [1.12, 3.81]
10.2 Pelvic haematoma	3	208	Odds Ratio (M-H, Fixed, 95% CI)	0.77 [0.19, 3.20]
10.3 Vaginal cuff infection	4	276	Odds Ratio (M-H, Fixed, 95% CI)	0.98 [0.22, 4.39]
10.4 Abdominal wall infection	1	80	Odds Ratio (M-H, Fixed, 95% CI)	3.08 [0.12, 77.80]
10.5 UTI	2	140	Odds Ratio (M-H, Fixed, 95% CI)	1.00 [0.14, 7.25]
10.6 Chest infection	1	60	Odds Ratio (M-H, Fixed, 95% CI)	0.19 [0.01, 4.06]
10.7 Febrile episodes or unspecified infection	7	1228	Odds Ratio (M-H, Fixed, 95% CI)	0.91 [0.63, 1.32]
10.8 Thrombo-embolism	2	904	Odds Ratio (M-H, Fixed, 95% CI)	2.73 [0.30, 25.01]
11 Pain relief (descriptive data)			Other data	No numeric data
11.1 Pain scales			Other data	No numeric data
11.2 Postoperative analgesics			Other data	No numeric data
12 Length of hospital stay (days)	5	685	Mean Difference (IV, Fixed, 95% CI)	-0.16 [-0.38, 0.07]
13 Length of hospital stay (descriptive data)			Other data	No numeric data
14 Cost (descriptive data)			Other data	No numeric data

Comparison 6. LH subcategory analyses versus VH

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Return to normal activities (days)	2	140	Mean Difference (IV, Fixed, 95% CI)	-1.07 [-4.21, 2.06]
1.1 LAVH versus VH	1	80	Mean Difference (IV, Fixed, 95% CI)	-1.60 [-5.11, 1.91]
1.2 LH(a) versus VH	1	60	Mean Difference (IV, Fixed, 95% CI)	1.0 [-5.95, 7.95]
1.3 TLH versus VH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.4 Non-categorisable LH versus VH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
2 Bladder injury	7	1205	Odds Ratio (M-H, Fixed, 95% CI)	1.46 [0.63, 3.35]
2.1 LAVH versus VH	1	80	Odds Ratio (M-H, Fixed, 95% CI)	0.33 [0.01, 8.22]
2.2 LH(a) versus VH	2	136	Odds Ratio (M-H, Fixed, 95% CI)	2.98 [0.30, 29.43]
2.3 TLH versus VH	2	440	Odds Ratio (M-H, Fixed, 95% CI)	2.18 [0.60, 7.86]
2.4 Non-categorisable LH versus VH	2	549	Odds Ratio (M-H, Fixed, 95% CI)	0.83 [0.18, 3.79]

3 Ureter injury	2	904	Odds Ratio (M-H, Fixed, 95% CI)	5.64 [0.72, 44.03]
3.1 LAVH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
3.2 LH(a) versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
3.3 TLH versus VH	1	400	Odds Ratio (M-H, Fixed, 95% CI)	11.28 [0.62, 205.39]
3.4 Non-categorisable LH versus VH	1	504	Odds Ratio (M-H, Fixed, 95% CI)	1.51 [0.06, 37.18]
4 Urinary tract (bladder or ureter) injury	7	1205	Odds Ratio (M-H, Fixed, 95% CI)	2.06 [0.94, 4.54]
4.1 LAVH versus VH	1	80	Odds Ratio (M-H, Fixed, 95% CI)	0.33 [0.01, 8.22]
4.2 LH(a) versus VH	2	136	Odds Ratio (M-H, Fixed, 95% CI)	2.98 [0.30, 29.43]
4.3 TLH versus VH	2	440	Odds Ratio (M-H, Fixed, 95% CI)	3.69 [1.11, 12.24]
4.4 Non-categorisable LH versus VH	2	549	Odds Ratio (M-H, Fixed, 95% CI)	1.01 [0.23, 4.38]
5 Bowel injury	2	904	Odds Ratio (M-H, Fixed, 95% CI)	3.02 [0.12, 74.46]
5.1 LAVH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
5.2 LH(a) versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
5.3 TLH versus VH	1	400	Odds Ratio (M-H, Fixed, 95% CI)	3.02 [0.12, 74.46]
5.4 Non-categorisable LH versus VH	1	504	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
6 Vascular injury	4	685	Odds Ratio (M-H, Fixed, 95% CI)	1.58 [0.48, 5.27]
6.1 LAVH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
6.2 LH(a) versus VH	2	136	Odds Ratio (M-H, Fixed, 95% CI)	2.89 [0.11, 74.15]
6.3 TLH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
6.4 Non-categorisable LH versus VH	2	549	Odds Ratio (M-H, Fixed, 95% CI)	1.42 [0.39, 5.22]
7 Fistula	1	56	Odds Ratio (M-H, Fixed, 95% CI)	0.30 [0.01, 7.67]
7.1 LAVH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
7.2 LH(a) versus VH	1	56	Odds Ratio (M-H, Fixed, 95% CI)	0.30 [0.01, 7.67]
7.3 TLH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
7.4 Non-categorisable LH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
8 Urinary dysfunction	1	80	Odds Ratio (M-H, Fixed, 95% CI)	3.08 [0.12, 77.80]
8.1 LAVH versus VH	1	80	Odds Ratio (M-H, Fixed, 95% CI)	3.08 [0.12, 77.80]
8.2 LH(a) versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
8.3 TLH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
8.4 Non-categorisable LH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
9 Bleeding	2	904	Odds Ratio (M-H, Fixed, 95% CI)	2.76 [1.02, 7.42]
9.1 LAVH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
9.2 LH(a) versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
9.3 TLH versus VH	1	400	Odds Ratio (M-H, Fixed, 95% CI)	2.94 [1.04, 8.31]
9.4 Non-categorisable LH versus VH	1	504	Odds Ratio (M-H, Fixed, 95% CI)	1.51 [0.06, 37.18]
10 Transfusion	7	1249	Odds Ratio (M-H, Fixed, 95% CI)	2.07 [1.12, 3.81]
10.1 LAVH versus VH	2	128	Odds Ratio (M-H, Fixed, 95% CI)	0.49 [0.04, 5.60]
10.2 LH(a) versus VH	3	217	Odds Ratio (M-H, Fixed, 95% CI)	2.49 [0.63, 9.86]
10.3 TLH versus VH	1	400	Odds Ratio (M-H, Fixed, 95% CI)	2.94 [1.04, 8.31]
10.4 Non-categorisable LH versus VH	1	504	Odds Ratio (M-H, Fixed, 95% CI)	1.74 [0.63, 4.79]
11 Pelvic haematoma	3	208	Odds Ratio (M-H, Fixed, 95% CI)	0.77 [0.19, 3.20]
11.1 LAVH versus VH	2	128	Odds Ratio (M-H, Fixed, 95% CI)	1.0 [0.17, 5.99]
11.2 LH(a) versus VH	1	80	Odds Ratio (M-H, Fixed, 95% CI)	0.49 [0.04, 5.60]

11.3 TLH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
11.4 Non-categorisable LH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
12 Unintended laparotomy	8	1290	Odds Ratio (M-H, Fixed, 95% CI)	1.44 [0.81, 2.56]
12.1 LAVH versus VH	2	128	Odds Ratio (M-H, Fixed, 95% CI)	4.33 [0.46, 40.61]
12.2 LH(a) versus VH	3	213	Odds Ratio (M-H, Fixed, 95% CI)	6.11 [1.06, 35.21]
12.3 TLH versus VH	1	400	Odds Ratio (M-H, Fixed, 95% CI)	1.26 [0.49, 3.27]
12.4 Non-categorisable LH versus VH	2	549	Odds Ratio (M-H, Fixed, 95% CI)	0.67 [0.26, 1.74]
13 Vaginal cuff infection	4	276	Odds Ratio (M-H, Fixed, 95% CI)	0.98 [0.22, 4.39]
13.1 LAVH versus VH	1	80	Odds Ratio (M-H, Fixed, 95% CI)	1.0 [0.06, 16.56]
13.2 LH(a) versus VH	3	196	Odds Ratio (M-H, Fixed, 95% CI)	0.97 [0.16, 5.73]
13.3 TLH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
13.4 Non-categorisable LH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
14 Wound/abdominal wall infection	1	80	Odds Ratio (M-H, Fixed, 95% CI)	3.08 [0.12, 77.80]
14.1 LAVH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
14.2 LH(a) versus VH	1	80	Odds Ratio (M-H, Fixed, 95% CI)	3.08 [0.12, 77.80]
14.3 TLH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
14.4 Non-categorisable LH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
15 Urinary tract infection	2	140	Odds Ratio (M-H, Fixed, 95% CI)	1.00 [0.14, 7.25]
15.1 LAVH versus VH	1	80	Odds Ratio (M-H, Fixed, 95% CI)	0.33 [0.01, 8.22]
15.2 LH(a) versus VH	1	60	Odds Ratio (M-H, Fixed, 95% CI)	3.10 [0.12, 79.23]
15.3 TLH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
15.4 Non-categorisable LH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
16 Chest infection	1	60	Odds Ratio (M-H, Fixed, 95% CI)	0.19 [0.01, 4.06]
16.1 LAVH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
16.2 LH(a) versus VH	1	60	Odds Ratio (M-H, Fixed, 95% CI)	0.19 [0.01, 4.06]
16.3 TLH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
16.4 Non-categorisable LH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
17 Febrile episodes or unspecified infection	7	1228	Odds Ratio (M-H, Fixed, 95% CI)	0.91 [0.63, 1.32]
17.1 LAVH versus VH	2	128	Odds Ratio (M-H, Fixed, 95% CI)	1.69 [0.22, 13.17]
17.2 LH(a) versus VH	3	196	Odds Ratio (M-H, Fixed, 95% CI)	0.99 [0.28, 3.51]
17.3 TLH versus VH	1	400	Odds Ratio (M-H, Fixed, 95% CI)	1.08 [0.62, 1.87]
17.4 Non-categorisable LH versus VH	1	504	Odds Ratio (M-H, Fixed, 95% CI)	0.72 [0.41, 1.25]
18 Thromboembolism	2	904	Odds Ratio (M-H, Fixed, 95% CI)	3.60 [0.42, 30.87]
18.1 LAVH versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
18.2 LH(a) versus VH	0	0	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
18.3 TLH versus VH	1	400	Odds Ratio (M-H, Fixed, 95% CI)	5.05 [0.24, 105.86]
18.4 Non-categorisable LH versus VH	1	504	Odds Ratio (M-H, Fixed, 95% CI)	2.52 [0.12, 52.76]
19 Estimated blood loss (mls)	3	196	Mean Difference (IV, Fixed, 95% CI)	9.72 [-50.21, 69.65]
19.1 LAVH versus VH	1	80	Mean Difference (IV, Fixed, 95% CI)	24.0 [-90.93, 138.93]
19.2 LH(a) versus VH	2	116	Mean Difference (IV, Fixed, 95% CI)	4.39 [-65.85, 74.63]
19.3 TLH versus VH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable

19.4 Non-categorisable LH versus VH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
20 Drop in haemoglobin	2	157	Mean Difference (IV, Fixed, 95% CI)	0.15 [-0.26, 0.56]
20.1 LAVH versus VH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
20.2 LH(a) versus VH	2	157	Mean Difference (IV, Fixed, 95% CI)	0.15 [-0.26, 0.56]
20.3 TLH versus VH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
20.4 Non-categorisable LH versus VH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
21 Length of hospital stay (days)	5	685	Mean Difference (IV, Fixed, 95% CI)	-0.16 [-0.38, 0.07]
21.1 LAVH versus VH	2	128	Mean Difference (IV, Fixed, 95% CI)	0.21 [-0.20, 0.63]
21.2 LH(a) versus VH	2	157	Mean Difference (IV, Fixed, 95% CI)	0.40 [-0.42, 1.22]
21.3 TLH versus VH	1	400	Mean Difference (IV, Fixed, 95% CI)	-0.40 [-0.68, -0.12]
21.4 Non-categorisable LH versus VH	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable

Comparison 7. Comparison of different types of LH - TLH versus LAVH

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Intraoperative visceral injury (dich)	2	864	Odds Ratio (M-H, Fixed, 95% CI)	0.81 [0.36, 1.82]
1.1 Bladder injury	2	186	Odds Ratio (M-H, Fixed, 95% CI)	0.55 [0.08, 3.76]
1.2 Ureter injury	1	101	Odds Ratio (M-H, Fixed, 95% CI)	3.03 [0.27, 34.52]
1.3 Urinary tract (bladder or ureter) injury	2	186	Odds Ratio (M-H, Fixed, 95% CI)	1.05 [0.25, 4.37]
1.4 Bowel injury	1	101	Odds Ratio (M-H, Fixed, 95% CI)	Not estimable
1.5 Vascular injury	1	101	Odds Ratio (M-H, Fixed, 95% CI)	1.48 [0.09, 24.27]
1.6 Conversion to laparotomy	2	189	Odds Ratio (M-H, Fixed, 95% CI)	0.33 [0.05, 2.01]
2 Long term complications (dich)	2	287	Odds Ratio (M-H, Fixed, 95% CI)	1.22 [0.63, 2.37]
2.1 Fistula	1	85	Odds Ratio (M-H, Fixed, 95% CI)	5.63 [0.26, 120.91]
2.2 Dyspareunia	1	101	Odds Ratio (M-H, Fixed, 95% CI)	2.64 [0.59, 11.72]
2.3 Orgasm (<1 of 3)	1	101	Odds Ratio (M-H, Fixed, 95% CI)	0.84 [0.38, 1.86]
3 Operation time (mins)	1	101	Mean Difference (IV, Fixed, 95% CI)	25.30 [10.00, 40.60]
4 Operation time (descriptive data)			Other data	No numeric data
5 Other intraoperative complications: estimated blood loss (descriptive data)			Other data	No numeric data
6 Short term outcomes (dich)	2	643	Odds Ratio (M-H, Fixed, 95% CI)	1.65 [0.86, 3.17]
6.1 Transfusion	2	186	Odds Ratio (M-H, Fixed, 95% CI)	0.60 [0.13, 2.76]
6.2 Pelvic hematoma	1	85	Odds Ratio (M-H, Fixed, 95% CI)	2.34 [0.55, 10.06]
6.3 UTI	1	85	Odds Ratio (M-H, Fixed, 95% CI)	8.09 [0.41, 161.61]
6.4 Vaginal cuff infection	1	101	Odds Ratio (M-H, Fixed, 95% CI)	0.28 [0.03, 2.45]
6.5 Febrile episodes or unspecified infection	2	186	Odds Ratio (M-H, Fixed, 95% CI)	3.77 [1.05, 13.51]
7 Pain relief (descriptive data)			Other data	No numeric data
7.1 Postoperative analgesics			Other data	No numeric data
8 Length of hospital stay (days)	1	101	Mean Difference (IV, Fixed, 95% CI)	Not estimable

9 Length of hospital stay (descriptive data)	Other data	No numeric data

Analysis 1.1. Comparison 1 VH versus AH, Outcome 1 Return to normal activities (days).

Review: Surgical approach to hysterectomy for benign gynaecological disease

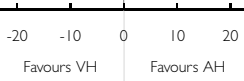
Comparison: 1 VH versus AH

Outcome: 1 Return to normal activities (days)

Study or subgroup	VH N	Mean(SD)	AH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Hwang 2002	30	29 (11)	30	41 (10)		34.0 %	-12.00 [-17.32, -6.68]
Miskry 2003	18	32 (13)	18	59 (29)		4.5 %	-27.00 [-41.68, -12.32]
Ottosen 2000	40	21.3 (8.5)	40	28.1 (9.5)		61.6 %	-6.80 [-10.75, -2.85]
Total (95% CI)	**88**		**88**			**100.0 %**	**-9.47 [-12.57, -6.37]**

Heterogeneity: Chi^2 = 8.10, df = 2 (P = 0.02); I^2 =75%

Test for overall effect: Z = 5.99 (P < 0.00001)



Analysis 1.2. Comparison 1 VH versus AH, Outcome 2 Long term outcomes: satisfaction (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 1 VH versus AH

Outcome: 2 Long term outcomes: satisfaction (dich)

Study or subgroup	VH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
Benassi 2002	58/60	54/59		100.0 %	2.69 [0.50, 14.42]
Total (95% CI)	**60**	**59**		**100.0 %**	**2.69 [0.50, 14.42]**

Total events: 58 (VH), 54 (AH)

Heterogeneity: not applicable

Test for overall effect: Z = 1.15 (P = 0.25)

Analysis 1.3. Comparison 1 VH versus AH, Outcome 3 Long term outcomes: quality of life (descriptive data).

Long term outcomes: quality of life (descriptive data)

Study	**Description**	**VH**	**AH**	**Comments**
Silva Filho 2006	Ques- tionnaire SF-36. Only data from functional capacity, physical aspect and pain are presented. A high score is a better quality of life. n= 30 one month after surgery, response rate 100%.n=30 one month after surgery, response rate 100%. 0	n=30 one month after surgery, response rate 100%.	n=30 one month after surgery, response rate 100%.	Functional capacity: VH mean = 95, IQ-range = 75-100. AH mean = 72.5, IQ-range = 55-90. Physical aspect: VH mean = 100, IQ-range = 25-100. AH mean=37.5, IQ-range=0-100. Pain: VH mean=84, IQ-range= 59.2- 100. AH mean=51, IQ-range=41-65. A higher rate of patients in VH would choose the same therapeutic modality (90 % versus 65.5 %, p = 0.021)

Analysis 1.4. Comparison 1 VH versus AH, Outcome 4 Intraoperative visceral injury (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease

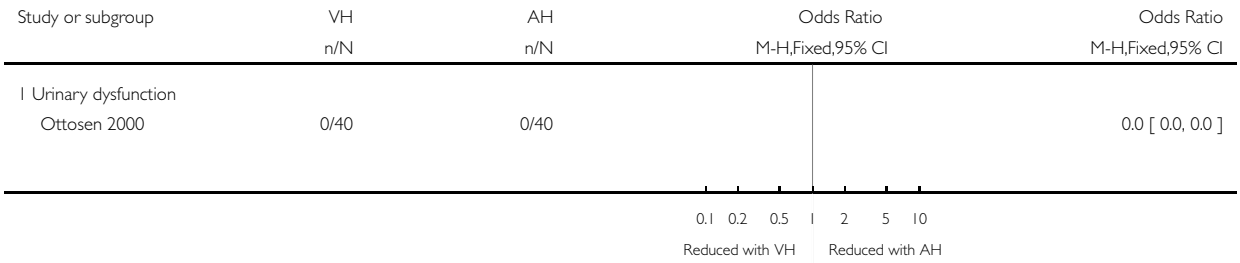
Comparison: 1 VH versus AH

Outcome: 4 Intraoperative visceral injury (dich)

Study or subgroup	VH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Odds Ratio M-H,Fixed,95% CI
1 Bladder injury				
Benassi 2002	0/60	0/59		0.0 [0.0, 0.0]
Ottosen 2000	1/40	0/40		3.08 [0.12, 77.80]
Ribiero 2003	1/20	0/20		3.15 [0.12, 82.16]
Subtotal (95% CI)	**120**	**119**		**3.11 [0.31, 30.90]**
Total events: 2 (VH), 0 (AH)				
Heterogeneity: Chi² = 0.00, df = 1 (P = 0.99); I² =0.0%				
Test for overall effect: Z = 0.97 (P = 0.33)				
2 Ureter injury				
Benassi 2002	0/60	0/59		0.0 [0.0, 0.0]
Subtotal (95% CI)	**60**	**59**		**0.0 [0.0, 0.0]**
Total events: 0 (VH), 0 (AH)				
Heterogeneity: not applicable				
Test for overall effect: Z = 0.0 (P < 0.00001)				
3 Urinary tract (bladder or ureter) injury				
Benassi 2002	0/60	0/59		0.0 [0.0, 0.0]
Ottosen 2000	1/40	0/40		3.08 [0.12, 77.80]
Ribiero 2003	1/20	0/20		3.15 [0.12, 82.16]
Subtotal (95% CI)	**120**	**119**		**3.11 [0.31, 30.90]**
Total events: 2 (VH), 0 (AH)				
Heterogeneity: Chi² = 0.00, df = 1 (P = 0.99); I² =0.0%				
Test for overall effect: Z = 0.97 (P = 0.33)				
4 Bowel injury				
Benassi 2002	0/60	0/59		0.0 [0.0, 0.0]
Subtotal (95% CI)	**60**	**59**		**0.0 [0.0, 0.0]**
Total events: 0 (VH), 0 (AH)				
Heterogeneity: not applicable				
Test for overall effect: Z = 0.0 (P < 0.00001)				
5 Vascular injury				
Benassi 2002	0/60	0/59		0.0 [0.0, 0.0]
Subtotal (95% CI)	**60**	**59**		**0.0 [0.0, 0.0]**
Total events: 0 (VH), 0 (AH)				
Heterogeneity: not applicable				
Test for overall effect: Z = 0.0 (P < 0.00001)				

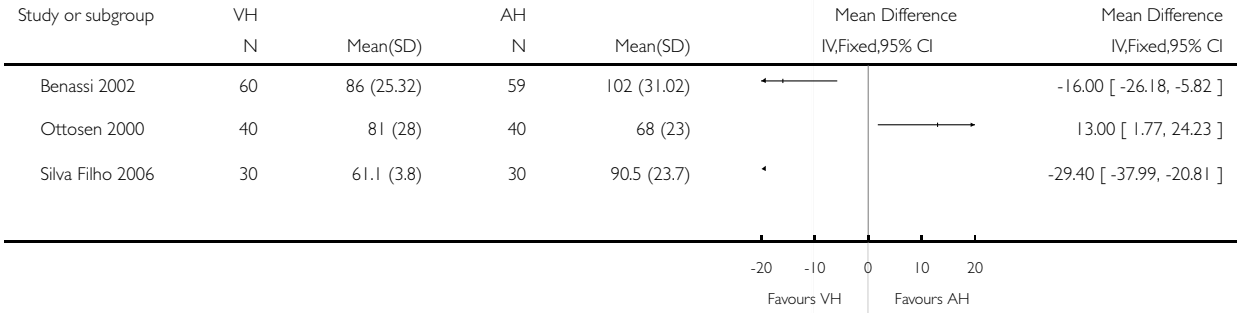
Analysis 1.5. Comparison 1 VH versus AH, Outcome 5 Long term complications (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease
Comparison: 1 VH versus AH
Outcome: 5 Long term complications (dich)



Analysis 1.6. Comparison 1 VH versus AH, Outcome 6 Operation time (mins).

Review: Surgical approach to hysterectomy for benign gynaecological disease
Comparison: 1 VH versus AH
Outcome: 6 Operation time (mins)



Analysis 1.7. Comparison 1 VH versus AH, Outcome 7 Operation time (descriptive data).

Operation time (descriptive data)

Study	VH	TAH	Comments
Hwang 2002	With 2nd procedure: median=93 range=80 to 110 n=3 Without 2nd procedure: median=74 range=40 to 120	With 2nd procedure: median=117 range=90 to 190 n=8 Without 2nd procedure: median=98	Not tested separately

Operation time (descriptive data) (*Continued*)

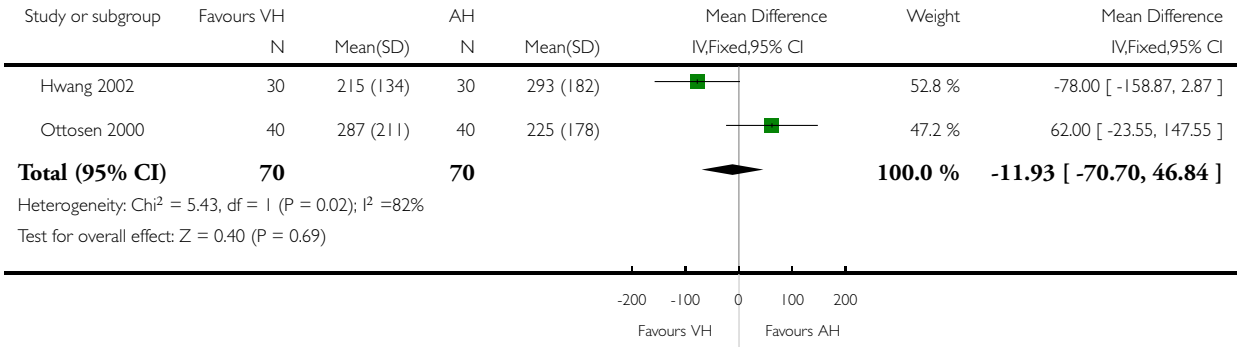
	n=27	range=85 to 150 n=22	
Miskry 2003	Mean 68.8 (range 30-180) mins n=18	Mean 68.2 (range 45-174) mins n=18	
Ribiero 2003	Mean 78 mins n=20	Mean 109 mins n=109	No measure of spread stated

Analysis 1.8. Comparison 1 VH versus AH, Outcome 8 Other intraoperative complications: estimated blood loss (cont).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 1 VH versus AH

Outcome: 8 Other intraoperative complications: estimated blood loss (cont)



Analysis 1.9. Comparison 1 VH versus AH, Outcome 9 Other intraoperative complications: estimated blood loss (descriptive data).

Other intraoperative complications: estimated blood loss (descriptive data)

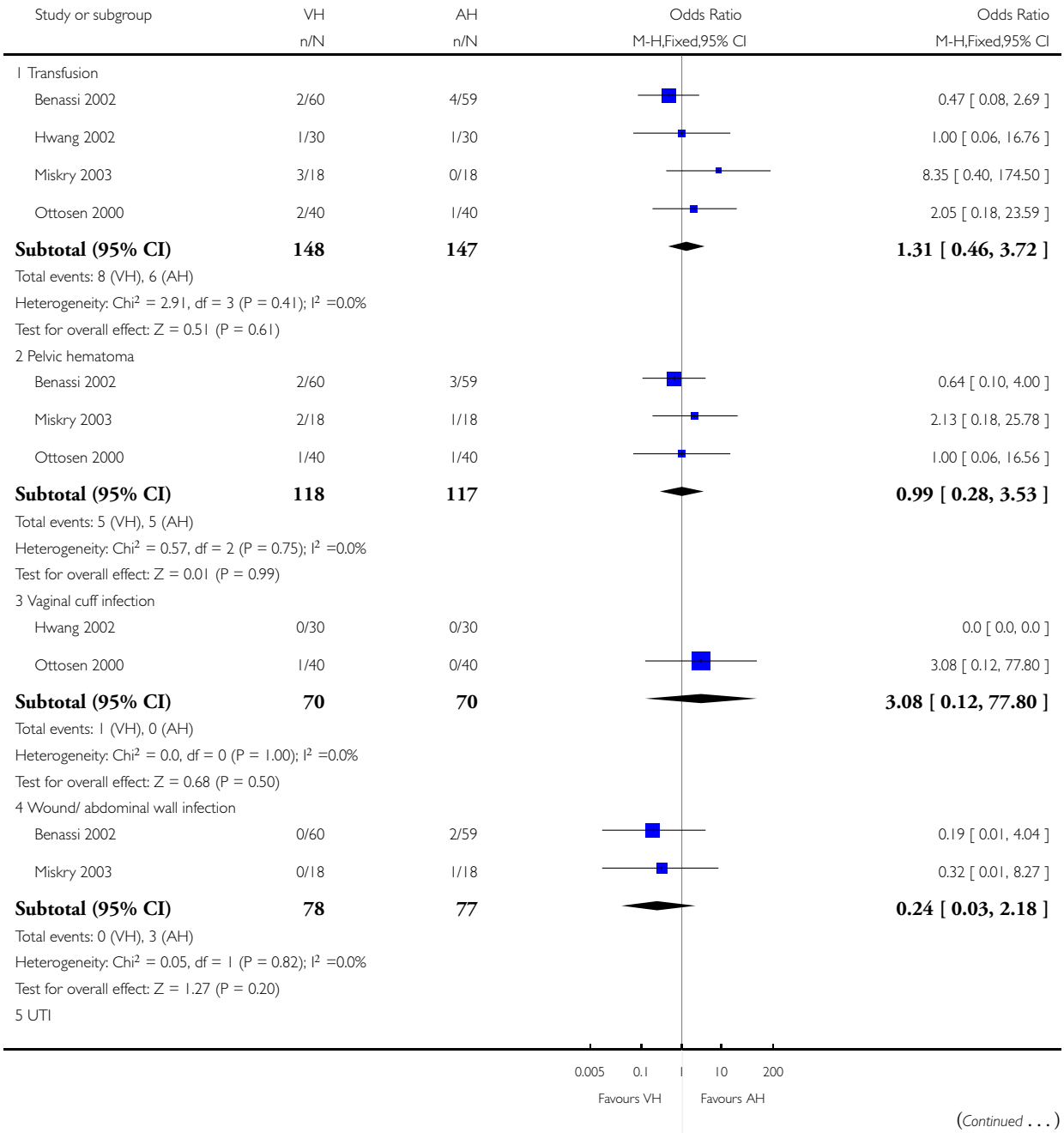
Study	VH	AH	Comments
Miskry 2003	Mean estimated blood loss 431mls (range 100-1000)	Mean estimated blood loss 353mls (range 50-1500)	p=0.86

Analysis 1.10. Comparison 1 VH versus AH, Outcome 10 Short term outcomes (cont).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 1 VH versus AH

Outcome: 10 Short term outcomes (cont)



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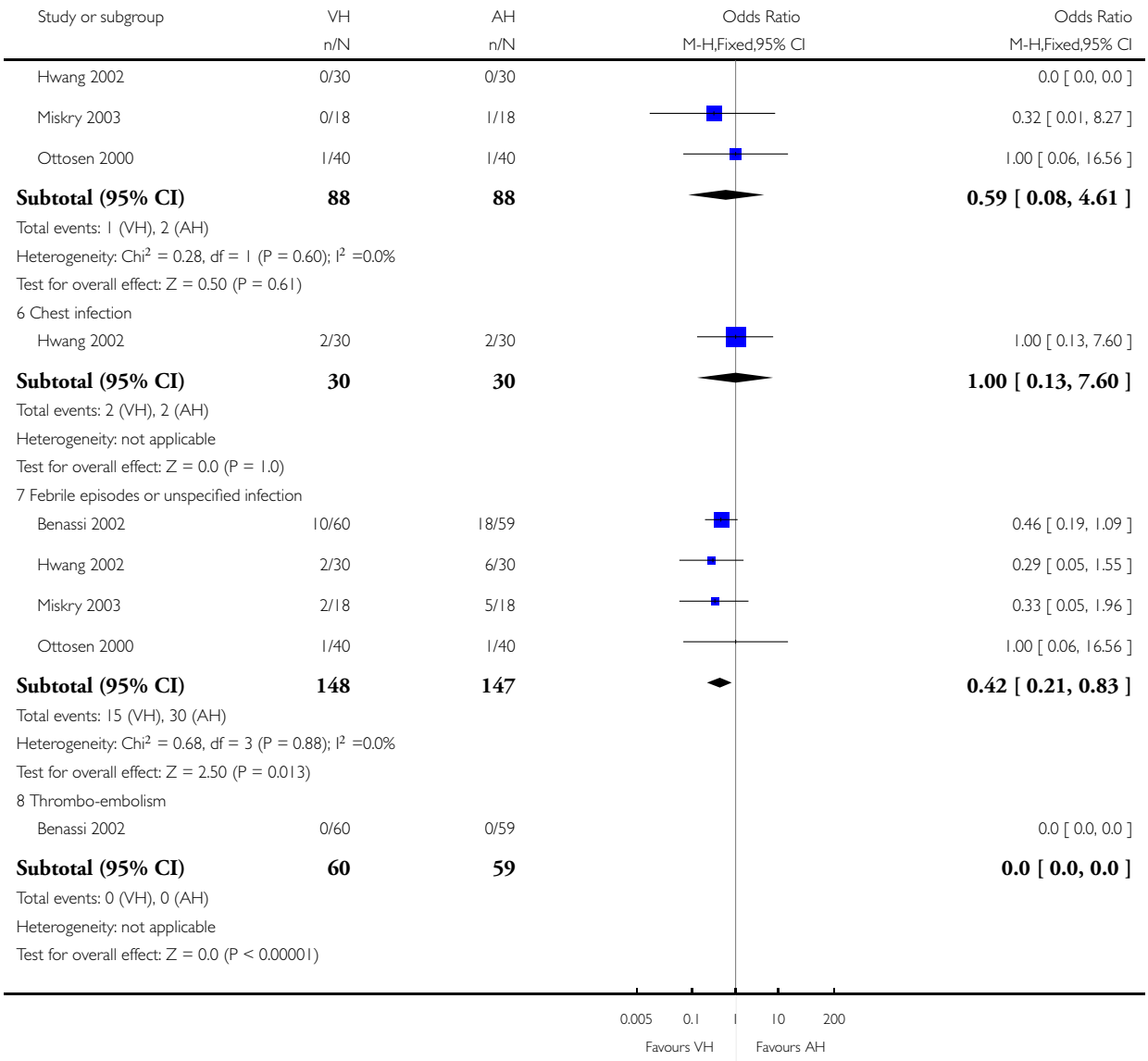


Analysis 1.11. Comparison 1 VH versus AH, Outcome 11 Short term outcomes (descriptive data).

Short term outcomes (descriptive data)

Study	VH	AH	Comments
Change in haemoglobin			
Miskry 2003	n=18 Mean drop in Hb 2.04 g/dL (range 0.3-4.2)	n=18 Mean drop in Hb 1.47 g/dL (range 0.4-4.3)	p=0.1

Analysis 1.12. Comparison 1 VH versus AH, Outcome 12 Short term outcome: pain relief (descriptive data).

Short term outcome: pain relief (descriptive data)

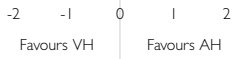
Study	VH	AH	Comments
Benassi 2002	40/51 (66.6%) needed analgesics	51/50 (86.4%) needed analgesics	p < 0.05
Silva Filho 2006	pain score 51 (41-65)	pain score 84 (59-100)	p = 0.002

Analysis 1.13. Comparison 1 VH versus AH, Outcome 13 Length of hospital stay (days).

Review: Surgical approach to hysterectomy for benign gynaecological disease
Comparison: 1 VH versus AH
Outcome: 13 Length of hospital stay (days)

Study or subgroup	VH N	Mean(SD)	AH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Benassi 2002	60	3.4 (0.7)	59	4.3 (1.5)		12.8 %	-0.90 [-1.32, -0.48]
Miskry 2003	18	3.6 (1.42)	18	5 (1.49)		2.5 %	-1.40 [-2.35, -0.45]
Ottosen 2000	40	2.8 (1.1)	40	3.7 (1)		10.7 %	-0.90 [-1.36, -0.44]
Silva Filho 2006	30	1.03 (0.27)	30	2.14 (0.41)		73.9 %	-1.11 [-1.29, -0.93]
Total (95% CI)	**148**		**147**			**100.0 %**	**-1.07 [-1.22, -0.92]**

Heterogeneity: Chi^2 = 1.81, df = 3 (P = 0.61); I^2 =0.0%
Test for overall effect: Z = 13.86 (P < 0.00001)



Analysis 1.14. Comparison 1 VH versus AH, Outcome 14 Length of hospital stay (descriptive data).

Length of hospital stay (descriptive data)

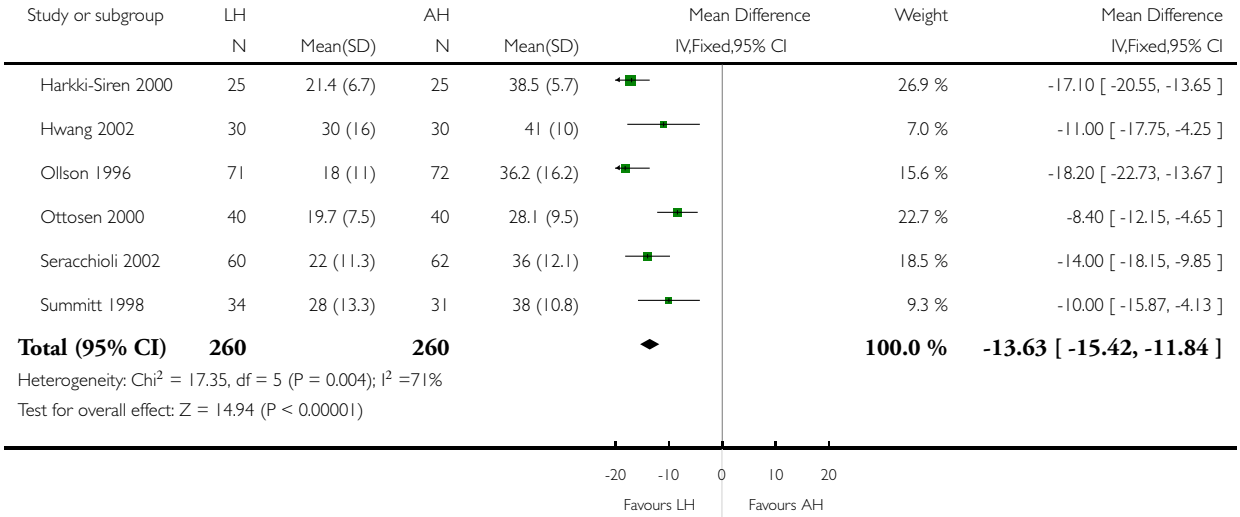
Study	VH	AH	Comments
Hwang 2002	n=30 median=4.7 days range (3-7)	n=30 median=5 days range (4-8)	Not tested separately
Ribiero 2003	n=20 All went home on second postoperative day	n=20 All went home on third postoperative day	

Analysis 2.1. Comparison 2 LH versus AH, Outcome 1 Return to normal activities (days).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 2 LH versus AH

Outcome: 1 Return to normal activities (days)



Analysis 2.2. Comparison 2 LH versus AH, Outcome 2 Return to normal activities (descriptive data).

Return to normal activities (descriptive data)

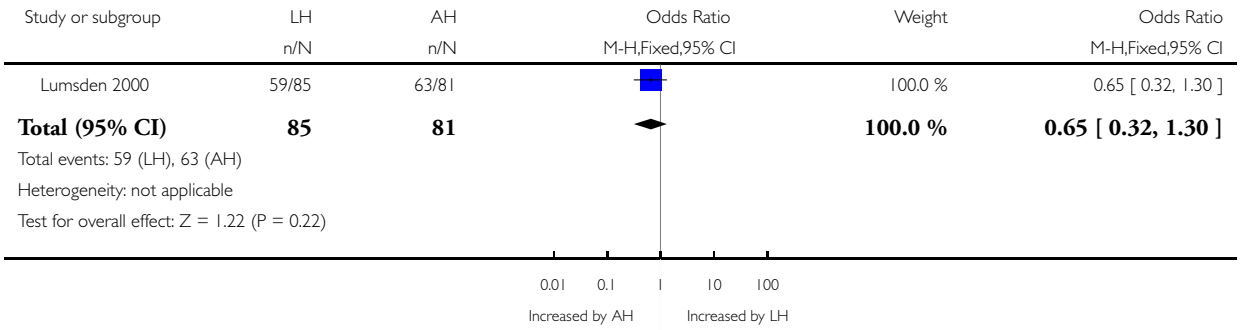
Study	LH	AH	Comments
Langebrekke 1996	n=46 median=19.5 days range (0-140)	n=54 median=36.5 days range (23-259)	P<0.001 Wilcoxon rank-sum test
Persson 2006	n=63 median=26 days range (3-86)	n=56 median=33.5 days range (14-61)	p=0.0081
Raju 1994	n=40 median=21 days range= (7-35)	n=40 median=42 days range (21-67)	P<0.0001 Mann-Whitney U test
Schutz 2002	n=28 median=42 days	n=20 median=42 days	

Analysis 2.3. Comparison 2 LH versus AH, Outcome 3 Long term outcomes: satisfaction (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 2 LH versus AH

Outcome: 3 Long term outcomes: satisfaction (dich)



Analysis 2.4. Comparison 2 LH versus AH, Outcome 4 Long term outcomes: quality of life (descriptive data).

Long term outcomes: quality of life (descriptive data)

Study	Description	LH	AH	Comments
Garry 2004	Questionnaire assessment of sexual activity, body image (BIS) and health status (SF12) before and after surgery (6 weeks, 4 months and 1 year). SF 12 Scores: Difference at each time point (high score =better quality of life). Body Image Scale: difference at each time point (low score=a better body image).	SF scores PHYSICAL COMPONENT SUMMARY (PCS-12) Baseline (n=447) Mean=44.9, sd=11.7 6 weeks (n=301) Mean=46.8, sd=10.1 4 months (n=304) Mean=52.6, sd=8.6 1 year (n=330) Mean=53.6, sd=8.4 MENTAL COMPONENT SUMMARY (MCS-12) Baseline (n=447 Mean=45.8, sd=11.7 6 weeks (n=301) Mean=50, sd=11.4 4 months (n=304) Mean=50.9, sd=10.5 1 year (n=330) Mean=50.7, sd=10.7	SF scores PHYSICAL COMPONENT SUMMARY (PCS-12) Baseline (n=221) Mean=45.6, sd=11.5 6 weeks (n=148) Mean=41.7, sd=9.7 4 months (n=134) Mean=51.6, sd=8.6 1 year (n=148) Mean=52.7, sd=9.3 MENTAL COMPONENT SUMMARY (MCS-12) Baseline (n=221) Mean=45.3, sd=11.3 6 weeks (n=148) Mean=51.9, sd=10.8 4 months (n=134) Mean=51.8, sd=9.5 1 year (n=148) Mean=51.9, sd=10.2	SF scores PCS-12 Baseline: difference CI = 0.6(-1.2,2.5) 6 weeks: difference CI=-5.1 (-7.1,-3.2). P<0.0001 4 months: difference CI=-1.0 (-2.8,0.7). P=0.25 1 year=difference in CI=-0.9 (-2.5,0.8). P=0.32 MCS-12 Baseline: difference in CI=-0.5 (-2.4, 1.4) 6 weeks: difference in CI=1.8 (-0.4, 4). P=0.11 4 months: difference in CI=0.8 (-1.3,2.9). P=0.44 1 year: difference in CI=1.1 (-0.9,3.2) P=0.27 Body Image Scale

Long term outcomes: quality of life (descriptive data) (*Continued*)

		Body Image Scale Baseline (n=540) Mean=8.8, sd=8.1 6 weeks (n=357) Mean=3.7, sd=4.9 4 months (n=346) Mean=3.3, sd=4.9 1 year (n=387) Mean=3.4, sd=5.2	Body image scale Baseline (n=270) Mean=9, sd=7.9 6 weeks (n=172) Mean=5.2, sd=5.9 4 months (n=159) Mean=4.4, sd=6.3 1 year (n=168) Mean=4.1, sd=5.7	Baseline: difference in CI= 0.2 (-0.9,1.4) 6 weeks: difference in CI= 1.5 (0.5,2.4). P=0.005 4 months: difference in CI=1.1 (0.06,2.1). P=0.06 1 year: difference in CI=0.7 (-0.2,1.7). P=0.13 Both aLH and AH groups had improvements in the Physical and Mental components of SF12 and Body Image Scale. These were maintained and improved at 12 months.Significant difference in PCS-12 at six weeks between aLH and AH and highly significant differences in BIS at 6 weeks, persists at four months but not at 12 months.
Kluivers 2007	Questionnaire RAND-36. A high score is a better quality of life. Statistical analysis with use of linear mixed model to evaluate the differences between 2 and 12 weeks while accounting for baseline value.	n=27 at baseline n= 27, 26, 26, 25 and 22 at 1, 2, 4, 6 and 12 weeks respectively.	n=32 at baseline n= 32, 32, 32, 31, 30 and 30 at 1, 2, 4, 6 and 12 weeks respectively.	Difference (95%CI) in favor of LH (the score range on subscales is 100, score range on total RAND-36 scales is 800): Physical functioning 7.8 (-0.3;15.9) Social functioning 7.0 (-1.8;15.7) Role physical 1.7 (-7.7;11.1) Role emotional 1.5 (-13.4;16.5) Mental health 3.6 (-2.8;9.9) Vitality 12.0 (4.7;19.3) Bodily pain 8.4 (-0.1;17.4) General health 0.0 (-8.1;8.1) Total RAND-36 49.6 (-5.1 ; 104.2) Only the difference in the

Long term outcomes: quality of life (descriptive data) (*Continued*)

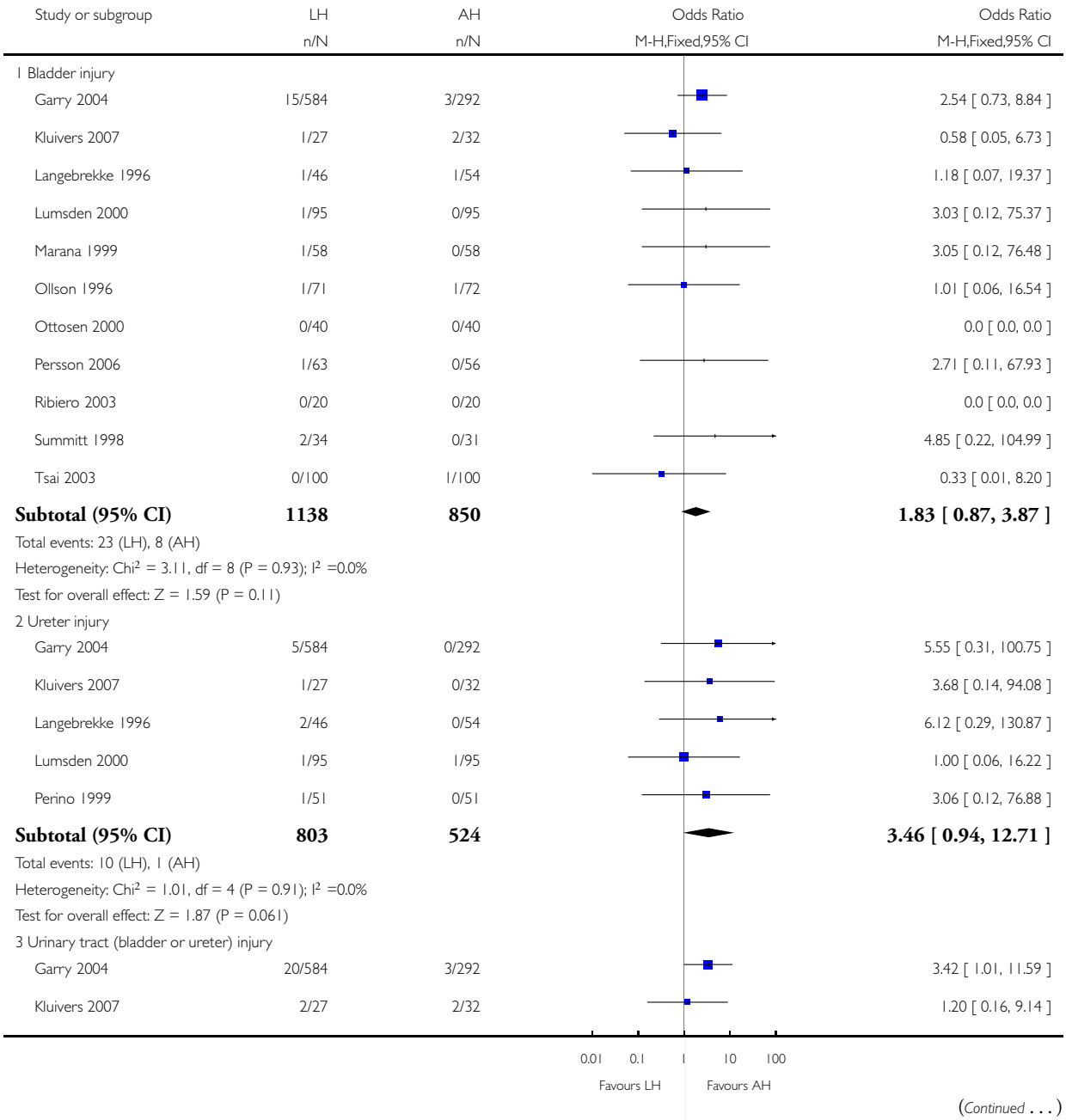
				subscale Vitality was statistically significant.
Lumsden 2000	Euroqol Health Questionnaire used to measure women's evaluation of their health state post surgery (1, 6 and 12 months after surgery). Use of a visual analogue thermometer (zero is worst imaginable health state and 100 is best imaginable health state).	One month (post-op minus pre-op): n=74. Mean=7, sd=24.1. Median=10, range (-50 to 50). Six months: n=62. Mean=11.3, sd=23.9. Median=15, range (-50 to 60). One year: n=43. Mean=12.6, sd=25. Median=14, range (-40 to 73).	One month: n=76. Mean=6.8, sd=19.2. Median=8, range (-50 to 60). Six months: n=61. Mean=14.9, sd=16.7. Median=15, range (-20 to 60). One year: n=47. Mean=15.9, sd=21. Median=15, range (-40 to 60).	Mean difference: One month:-16 (-7.2 to 6.9) Six months: 3.7 (-3.7 to 11). One year: 4.9 (-6.7 to 12.8) No significant differences in the change at one month, six months or a year after surgery.
Ollson 1996	Six to eight weeks after surgery participants were asked in an anonymous questionnaire if they considered the duration of their post-operative stay adequate.	9% of women in the LAVH group considered their time in hospital following surgery to be too short.	17% of women in the AH group considered their time in hospital following surgery to be too short.	
Persson 2006	Questionnaires: Psychological General Wellbeing (PGWI), Women Health Questionnaire (WHQ), Spielberger Trait Anxiety Inventory (STAI) and Beck's Depression Inventory (BDI). A higher score in the PGWB shows a higher degree of wellbeing, whereas in the WHQ, STAI, BDI a higher score shows the more undesirable outcomes. Assessment at baseline, and 5 weeks and 6 months postoperatively. Statistical analysis with the use of ANOVA for repeated measurements.	n=63 PGWB: Baseline: mean=96.7, sd=17.9. Five weeks: mean=100.4, sd=16.7. Six months: mean=104.7, sd=18.5. WHQ: Baseline: mean=64.9, sd=13.9. Five weeks: mean=54.6, sd=12.8. Six months: mean=55.0, sd=14.4. STAI: Baseline: mean=35.6, sd=9.1. Five weeks: mean=32.7, sd=8.7. Six months: mean=33.6, sd=10.2. BDI: Baseline: mean=6.6, sd=5.8. Five weeks: mean=4.6, sd=5.5. Six months: mean=5.3, sd=6.8.	n=56 PGWB: Baseline: mean=96.5, sd=16.5. Five weeks: mean=102.1, sd=16.4. Six months: mean=106.1, sd=16.0. WHQ: Baseline: mean=63.9, sd=18.2. Five weeks: mean=54.3, sd=17.1. Six months: mean=54.2, sd=17.2. STAI: Baseline: mean=34.7, sd=10.1. Five weeks: mean=31.7, sd=10.6. Six months: mean=31.7, sd=9.2. BDI: Baseline: mean=6.9, sd=6.1. Five weeks: mean=5.0, sd=6.5. Six months: mean=4.0, sd=5.2.	Main effect between groups: PGWB p=0.719, WHQ p=0.800, STAI p=0.418, BDI p=0.788. Main effect over time: PGWB p<0.0001, WHQ p<0.0001, STAI p=0.0002, BDI p=0.0002. Interaction: PGWB p=0.772, WHQ p=0.953, STAI p=0.762, BDI p=0.223.

Analysis 2.5. Comparison 2 LH versus AH, Outcome 5 Intraoperative visceral injury (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 2 LH versus AH

Outcome: 5 Intraoperative visceral injury (dich)



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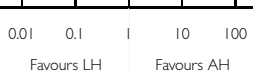
Study or subgroup	LH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Odds Ratio M-H,Fixed,95% CI
Langebrekke 1996	3/46	1/54		3.70 [0.37, 36.83]
Lumsden 2000	2/95	1/95		2.02 [0.18, 22.68]
Marana 1999	1/58	0/58		3.05 [0.12, 76.48]
Ollson 1996	1/71	1/72		1.01 [0.06, 16.54]
Ottosen 2000	0/40	0/40		0.0 [0.0, 0.0]
Perino 1999	1/51	0/51		3.06 [0.12, 76.88]
Persson 2006	1/63	0/56		2.71 [0.11, 67.93]
Ribiero 2003	0/20	0/20		0.0 [0.0, 0.0]
Summitt 1998	2/34	0/31		4.85 [0.22, 104.99]
Tsai 2003	0/100	1/100		0.33 [0.01, 8.20]
Subtotal (95% CI)	**1189**	**901**		**2.41 [1.21, 4.82]**
Total events: 33 (LH), 9 (AH)				
Heterogeneity: Chi^2 = 3.01, df = 9 (P = 0.96); I^2 =0.0%				
Test for overall effect: Z = 2.50 (P = 0.012)				
4 Bowel injury				
Garry 2004	1/584	3/292		0.17 [0.02, 1.60]
Kluivers 2007	0/27	0/32		0.0 [0.0, 0.0]
Lumsden 2000	0/95	0/95		0.0 [0.0, 0.0]
Subtotal (95% CI)	**706**	**419**		**0.17 [0.02, 1.60]**
Total events: 1 (LH), 3 (AH)				
Heterogeneity: Chi^2 = 0.0, df = 0 (P = 1.00); I^2 =0.0%				
Test for overall effect: Z = 1.56 (P = 0.12)				
5 Vascular injury				
Garry 2004	8/584	3/292		1.34 [0.35, 5.08]
Raju 1994	2/40	0/40		5.26 [0.24, 113.11]
Subtotal (95% CI)	**624**	**332**		**1.76 [0.52, 5.87]**
Total events: 10 (LH), 3 (AH)				
Heterogeneity: Chi^2 = 0.65, df = 1 (P = 0.42); I^2 =0.0%				
Test for overall effect: Z = 0.91 (P = 0.36)				
6 Bleeding				
Garry 2004	3/584	1/292		1.50 [0.16, 14.51]
Harkki-Siren 2000	0/25	2/25		0.18 [0.01, 4.04]
Marana 1999	0/58	1/58		0.33 [0.01, 8.21]
Muzii 2007	0/40	1/41		0.33 [0.01, 8.43]
Ollson 1996	0/71	3/72		0.14 [0.01, 2.74]
Subtotal (95% CI)	**778**	**488**		**0.38 [0.12, 1.19]**



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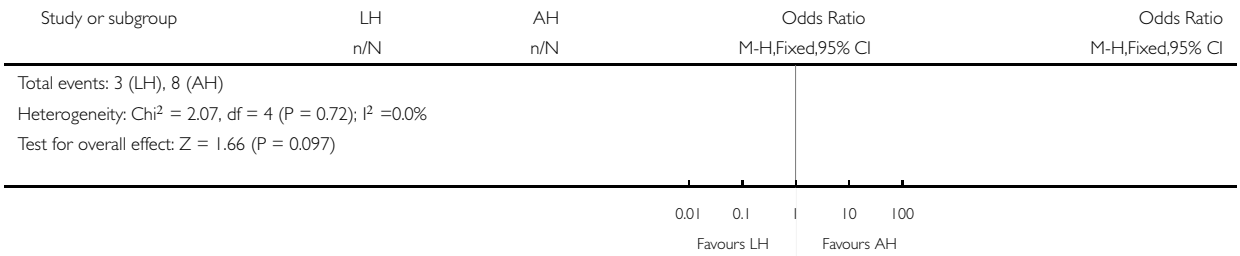
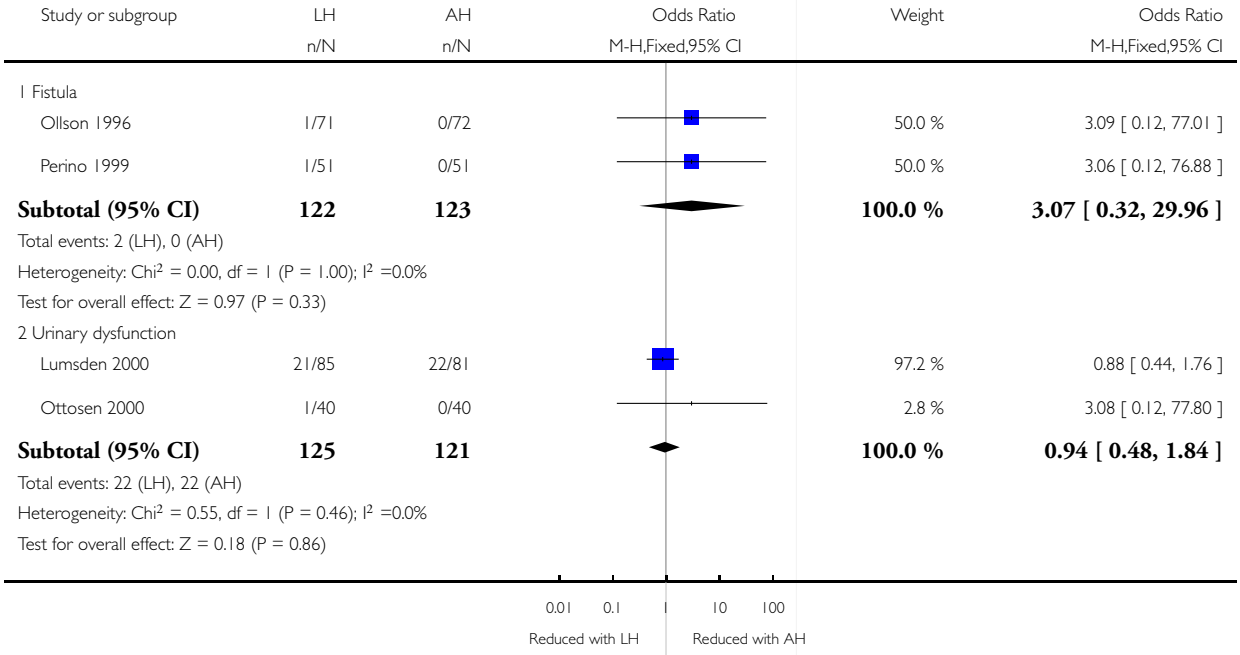


Analysis 2.6. Comparison 2 LH versus AH, Outcome 6 Long term complications (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 2 LH versus AH

Outcome: 6 Long term complications (dich)

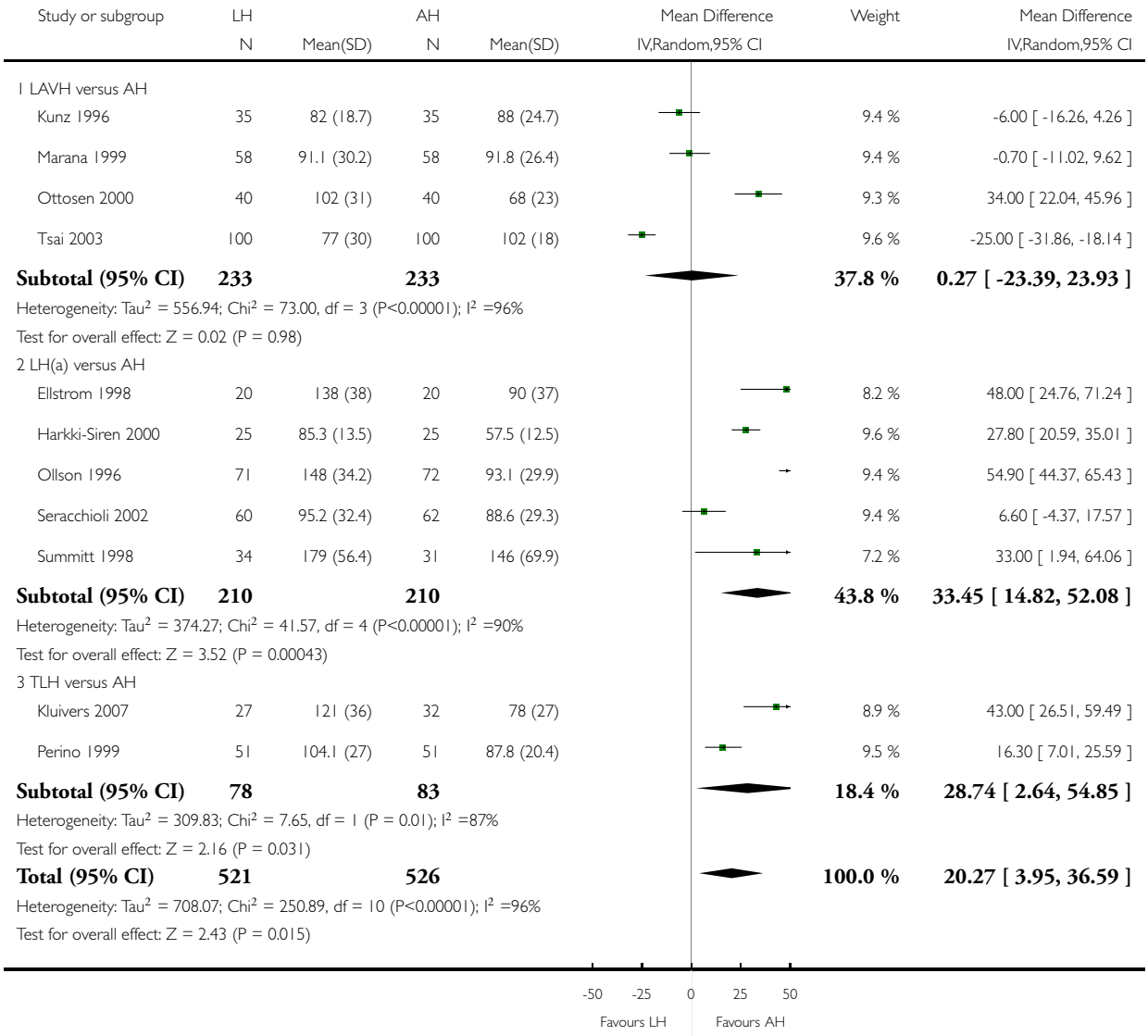


Analysis 2.7. Comparison 2 LH versus AH, Outcome 7 Operation time (mins).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 2 LH versus AH

Outcome: 7 Operation time (mins)



Analysis 2.8. Comparison 2 LH versus AH, Outcome 8 Operation time (descriptive data).

Operation time (descriptive data)

Study	LH	AH	Comments

Operation time (descriptive data) (*Continued*)

Falcone 1999	n=23 median=180 mins range (139-225)	n=21 median=130 mins range (97-155)	LH(a) v AH Wilcoxon rank-sum test P<0.001
Ferrari 2000	n=31 median=135 mins range (115-173)	n=31 median=120 mins range (98-123)	LAVH v AH P=0.001 Calculated from the first incision to closure of all wounds.
Garry 2004	n=584 median=84 mins range(10-325)	n=292 median=50 mins range (19-155)	non-categorisable LH v AH Calculated from first incision to last suture.
Hwang 2002	With 2nd procedure n=13 median=119 range (80-165) Without 2nd procedure n=17 median=109 mins range (85-175)	With 2nd procedure n=8 median=117 mins range (90-190) Without 2nd procedure n=22 Median=98 Range (85-150)	LH(a) v AH Not tested separately
Langebrekke 1996	n=46 median=100 mins range (50-153)	n=54 median=60.5 mins range (22-105)	LH(a) v AH
Muzii 2007	n=40 median=86 mins range (60-120)	n=41 median=58 mins range (45-75)	LAVH v minilaparotomy AH
Persson 2006	n=63 median=99 mins range (50-190)	n=56 median=64 mins range (35-150)	LH(a) v AH p<0.0001(students t test)
Raju 1994	n=40 median=100 mins range (61-180)	n=40 median=57 mins range (25-151)	LAVH v AH P<0.0001 Mann-Whitney U test. Calculated from first incision to time all wounds were closed, dressed and urinary catheter inserted.
Ribiero 2003	n=20 Mean 119 mins (no measure of spread reported)	n=20 Mean 109 mins (no measure of spread reported)	TLH v AH
Schutz 2002	n=28 median=133 mins range (120-160)	n=20 median=132 mins range (121-145)	LH(a) v AH

Operation time (descriptive data) (*Continued*)

Yuen 1998	n=20 median=95 mins range (79-143)	n=24 median=105 mins range (86-120)	LH(a) v AH Calculated from first surgical incision to time of last suture.

Analysis 2.9. Comparison 2 LH versus AH, Outcome 9 Other intraoperative complications: estimated blood loss.

Review: Surgical approach to hysterectomy for benign gynaecological disease

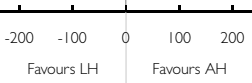
Comparison: 2 LH versus AH

Outcome: 9 Other intraoperative complications: estimated blood loss

Study or subgroup	LH N	Mean(SD)	AH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Harkki-Siren 2000	25	156.8 (104.2)	25	268 (136.8)		16.5 %	-111.20 [-178.61, -43.79]
Hwang 2002	30	343 (218)	30	293 (182)		7.3 %	50.00 [-51.62, 151.62]
Marana 1999	58	264.7 (194.4)	58	353.9 (254.6)		11.1 %	-89.20 [-171.64, -6.76]
Ottosen 2000	40	311 (305)	40	225 (178)		6.3 %	86.00 [-23.44, 195.44]
Seracchioli 2002	60	311.6 (182)	62	376.9 (225)		14.3 %	-65.30 [-137.81, 7.21]
Summitt 1998	34	568 (394)	31	660.5 (610)		1.2 %	-92.50 [-344.79, 159.79]
Tsai 2003	100	202 (130)	100	238 (168)		43.4 %	-36.00 [-77.63, 5.63]
Total (95% CI)	**347**		**346**			**100.0 %**	**-45.26 [-72.68, -17.85]**

Heterogeneity: Chi^2 = 14.29, df = 6 (P = 0.03); I^2 =58%

Test for overall effect: Z = 3.24 (P = 0.0012)

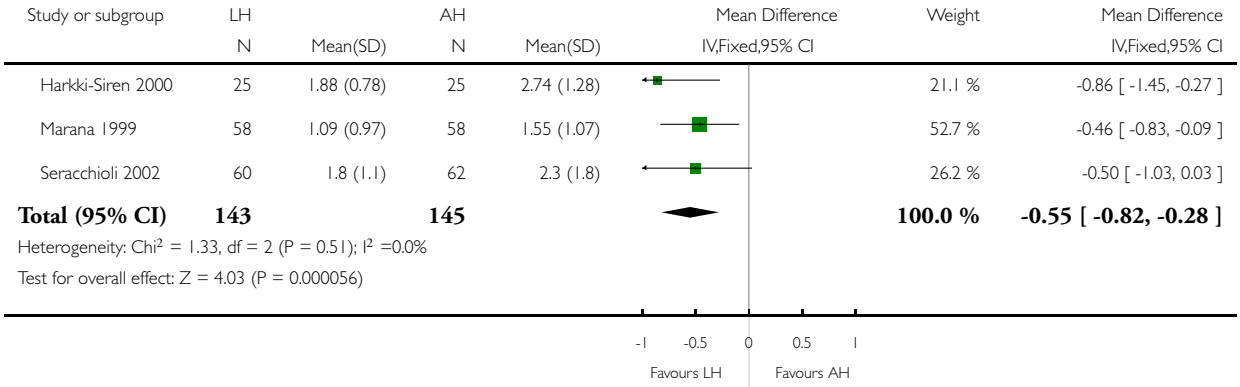


Analysis 2.10. Comparison 2 LH versus AH, Outcome 10 Other intraoperative complications: change in Hb.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 2 LH versus AH

Outcome: 10 Other intraoperative complications: change in Hb



Analysis 2.11. Comparison 2 LH versus AH, Outcome 11 Other intraoperative complications (descriptive data).

Other intraoperative complications (descriptive data)

Study	LH	AH	Comments
Estimated blood loss (ml)			
Falcone 1999	n=23 median=450 mL range (250-700)	n=21 median=250mL range (150-300)	P=0.003 Wilcoxon rank-sum test
Kluivers 2007	n=27 median=200mL range (0-650)	n=32 median=300 range (100-1100)	p=0.01 Mann-Whitney U test
Persson 2006	n=63 median=150 mL range (50-1200)	n=56 median=175 mL range (25-800)	NS
Raju 1994	n=40 median=260 range (70-700)	n=40 median=220 range (50-500)	Mann-Whitney U test
Yuen 1998	n=20 median=200 range (150-350)	n=24 median=450 range (300-800)	P<0.01 Mann-Whitney U test
Change in Hb			

Other intraoperative complications (descriptive data) (*Continued*)

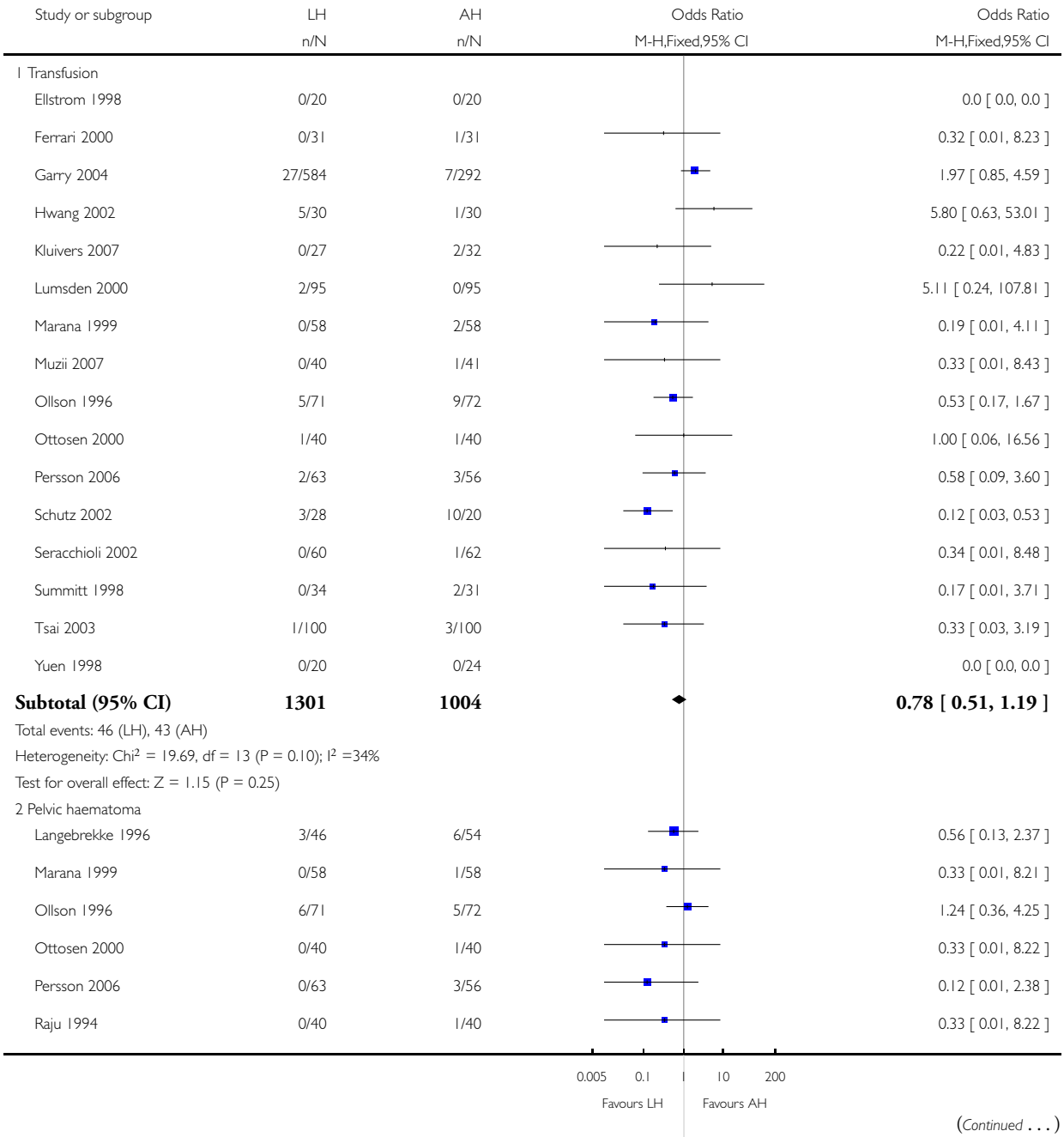
Ferrari 2000	n=31 median=1.1g/dL range (0.8-1.9)	n=31 median=1.8g/dL range (0.7-2.5)	
Kluivers 2007	n=27	n=27	Equal drop in hemoglobin and hematocrit (pre-operative and day 1 after surgery)
Langebrekke 1996	n=46 median=2g/L range - not stated	n=54 median=1.9g/L range - not stated	
Muzii 2007	n=40 median=1.7 g/dL range (1.2-2)	n=41 median=1.4 g/dL range (0.4-2.1)	measured on day 1 postoperatively p=0.10
Raju 1994	n=40 median= 1.82g/dL range (0.1-4.8)	n=40 median=1.54 g/dL range (0.5-3.2)	
Schutz 2002	n=28 median=0.6g/dL range (0.2-1.25)	n=20 median=1.55 g/dL range (0.5-2.67)	P<0.05
Yuen 1998	n=20 median=1.2 g/dL range (0.8-2.3)	n=24 median=1.7 range (0.5-2.8)	

Analysis 2.12. Comparison 2 LH versus AH, Outcome 12 Short term outcomes (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 2 LH versus AH

Outcome: 12 Short term outcomes (dich)



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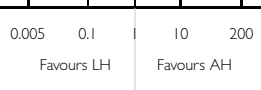
Study or subgroup	LH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Odds Ratio M-H,Fixed,95% CI
Yuen 1998	4/20	1/24		5.75 [0.59, 56.35]
Subtotal (95% CI)	**338**	**344**		**0.79 [0.40, 1.56]**
Total events: 13 (LH), 18 (AH)				
Heterogeneity: Chi² = 6.03, df = 6 (P = 0.42); I² =0%				
Test for overall effect: Z = 0.69 (P = 0.49)				
3 Vaginal cuff infection				
Ellstrom 1998	0/20	1/20		0.32 [0.01, 8.26]
Falcone 1999	1/23	0/21		2.87 [0.11, 74.28]
Harkki-Siren 2000	5/25	1/25		6.00 [0.65, 55.66]
Hwang 2002	0/30	0/30		0.0 [0.0, 0.0]
Marana 1999	0/58	1/58		0.33 [0.01, 8.21]
Ollson 1996	6/71	4/72		1.57 [0.42, 5.82]
Ottosen 2000	1/40	0/40		3.08 [0.12, 77.80]
Persson 2006	1/63	1/56		0.89 [0.05, 14.52]
Tsai 2003	1/100	2/100		0.49 [0.04, 5.55]
Subtotal (95% CI)	**430**	**422**		**1.43 [0.67, 3.04]**
Total events: 15 (LH), 10 (AH)				
Heterogeneity: Chi² = 4.48, df = 7 (P = 0.72); I² =0.0%				
Test for overall effect: Z = 0.92 (P = 0.36)				
4 Wound/abdominal wall infection				
Harkki-Siren 2000	0/25	4/25		0.09 [0.00, 1.84]
Langebrekke 1996	1/46	0/54		3.59 [0.14, 90.36]
Lumsden 2000	1/95	4/95		0.24 [0.03, 2.21]
Muzii 2007	0/40	2/41		0.20 [0.01, 4.19]
Summitt 1998	1/34	7/31		0.10 [0.01, 0.90]
Yuen 1998	1/20	0/24		3.77 [0.15, 97.74]
Subtotal (95% CI)	**260**	**270**		**0.31 [0.12, 0.77]**
Total events: 4 (LH), 17 (AH)				
Heterogeneity: Chi² = 6.22, df = 5 (P = 0.29); I² =20%				
Test for overall effect: Z = 2.52 (P = 0.012)				
5 UTI				
Falcone 1999	3/23	2/21		1.43 [0.21, 9.49]
Hwang 2002	1/30	0/30		3.10 [0.12, 79.23]
Lumsden 2000	4/95	6/95		0.65 [0.18, 2.39]
Ollson 1996	5/71	3/72		1.74 [0.40, 7.58]
Ottosen 2000	0/40	1/40		0.33 [0.01, 8.22]



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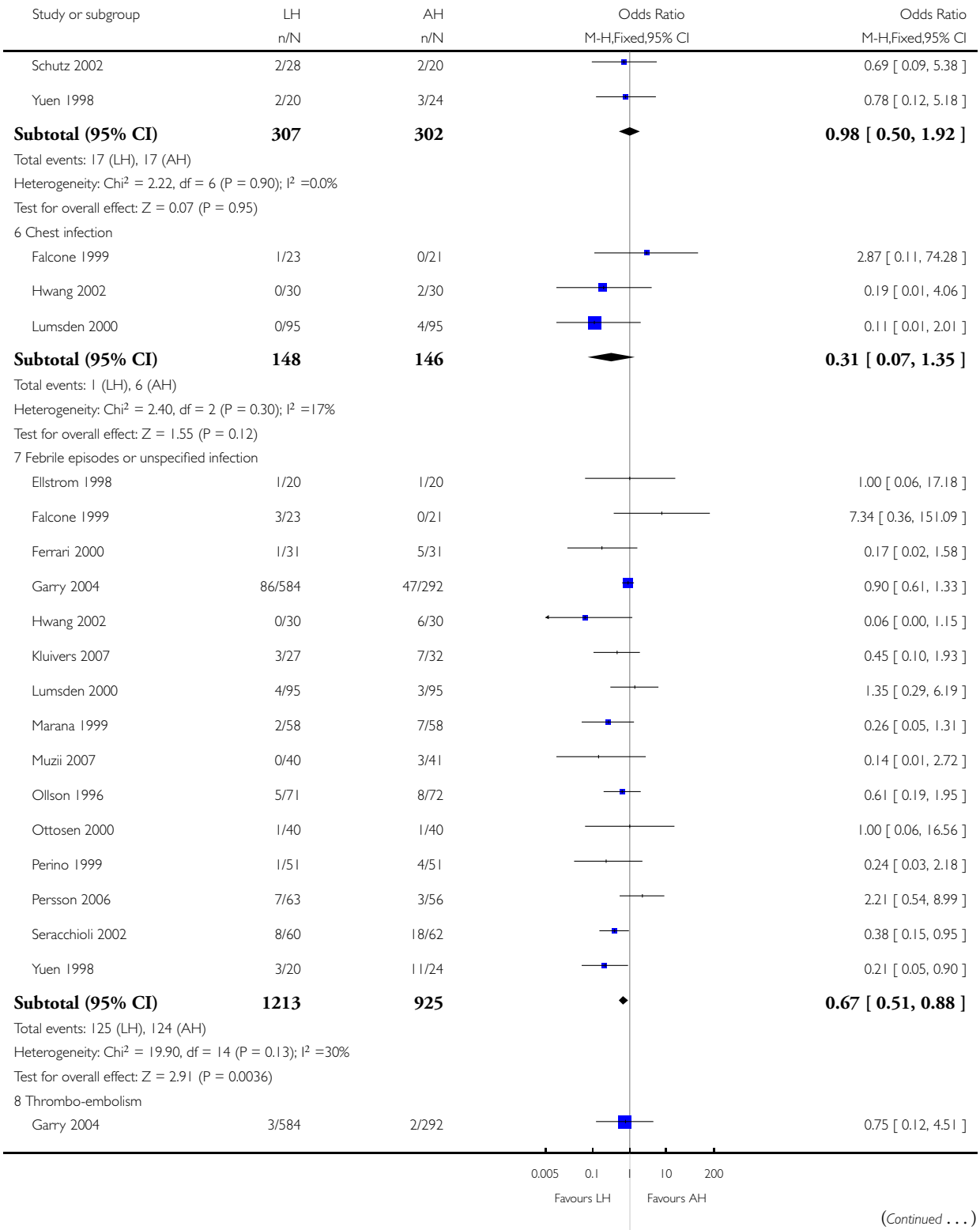

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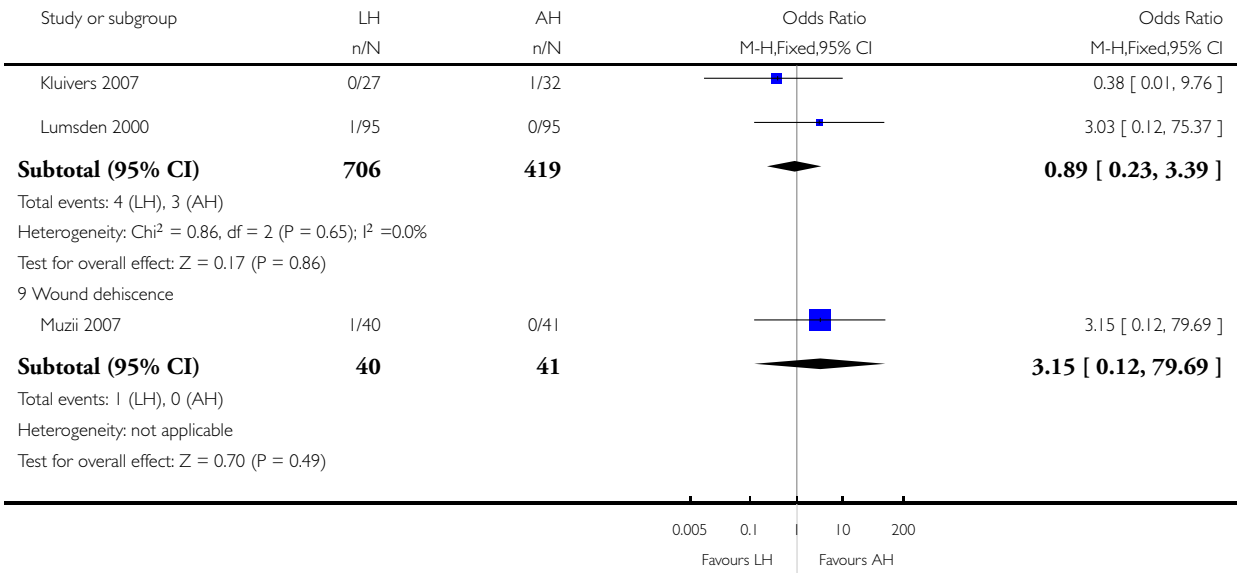


Analysis 2.13. Comparison 2 LH versus AH, Outcome 13 Pain relief (descriptive data).

Pain relief (descriptive data)

Study	Description	LH	AH	Conclusions
Pain scales				
Ellstrom 1998	Pain during rest and when coughing. 100mm visual analogue scale, endpoints 'no pain' and 'worst pain possible'. Day 0, Day 1 (10am & 6pm) and Day 2.	n=40 DAY 0(8pm). At rest: mean=22, sd=16. Coughing: mean=29, sd=20. DAY 1 (10am). At rest: mean=17, sd=16. Coughing: mean=32, sd=19. P<0.05 DAY 1 (6pm). At rest: mean=24, sd=20. Coughing: mean=31, sd=25. DAY 2 (10am). At rest: mean=10, sd=10. Coughing: mean=15, sd=14. P<0.01	n=40 DAY 0(8pm). At rest: mean=36, sd=26. Coughing: mean=48, sd=30. DAY 1(10am). At rest: mean=30, sd=24. Coughing: mean=53, sd=30. P<0.05 DAY 1(6pm). At rest: mean=28, sd=24. Coughing: mean=52, sd=28. DAY 2 (10am). At rest: mean=20, sd=22. Coughing: mean=47, sd=31. P<0.01	Lower pain score following LAVH compared to AH at 10am on 1st and 2nd day when coughing (P<0.05 and P<0.01 respectively). No significant difference with the pain scores at rest.
Falcone 1999	Weekly visual analogue scales for pain (from "no pain" to "most severe pain". Reported in graph form.	n=22 Data portrayed in graph.	n=20 Data portrayed in graph.	No significant difference in change over time (group by time interaction) between groups. No difference in mean pain scores over the postop-

Pain relief (descriptive data) (*Continued*)

				erative interval (P=0.38). The number of weeks before a pain score of less than 1 was recorded was not significantly different between the 2 groups (P= 0.95.
Garry 2004	Daily diary using a visual analogue scale, scored on day 0 (operation day), and days 2,7 and 21. Analysis of covariance used to adjust pain scores over days 0-6 by the number of days that opiates were used.	VH: n=168 vLH: n=336 Adjusted means: 3.1 VH and 3.5vLH, mean difference of -0.3 CI (-0.7, 0.002, p=0.07).	AH: n=292 aLH: n=584 Adjusted means: 3.9 AH and 3.5 aLH, mean difference of 0.4 CI (0.09, 0.7, p=0.01).	A higher proportion of AH participants used opiates than aLH. AH is more painful than aLH and LH has a tendancy to be less painful than vLH.
Marana 1999	10-point visual analogue scale. Evaluation of pain on postoperative days 1, 2 and 3.	n=58 DAY 0: mean=40, sd=1.2, P<0.001 DAY 1: mean=5.2, sd= 2.6, P<0.05 DAY 2: mean=2.3, sd= 2.3, P<0.001 DAY 3: mean 1.3, sd= 1.6, P<0.005	n=58 DAY 0: mean=5.9, sd= 2.3, P<0.001 DAY 1: mean=6.3, sd= 1.6, P<0.05 DAY 2: mean=4.4, sd= 1.9, P<0.001 DAY 3: mean=2.8, sd= 2.3, P<0.005	Significant difference between two groups at 3 evaluations. Lower pain score following LAVH compared to AH.
Muzii 2007	VAS scores (no further description). Postoperative day 1 and 2	n=40 Day 1 median=2.8 Range (0-6) Day 2 median=0.8 Range (0-3.7)	n=41 Day 1 median=4.4 Range (2-6.2) Day 2 median=2.9 Range (2-5.5)	Day 1 p<0.05 Day 2 p<0.05
Ollson 1996	Visual analogue scale (range 0-7) , two days after surgery.	n=71 Median=3.6, P<0.05	n=72 Median = 4.2, P<0.05	Postoperative pain 2 days after surgery was significantly less following LAVH compared to AH.
Perino 1999	10-point visual analogue scale, 0= no pain to 10= maximum pain. Assessed pain for 3 days after surgery.	n=51 DAY 1: mean=4.1, sd= 1.2. DAY 2: mean=2.3, sd= 1.6. DAY 3: mean 1.0, sd=0.7. P<0.001	n=51 DAY 1: mean=6.9, sd= 1.8. DAY 2: mean= 5.4, sd=1.3. DAY 3: mean=3.1, sd= 0.9. P<0.001	Participants who underwent LH had less intense postoperative pain than those in the AH group.
Schutz 2002	10-point visual analogue scale on days 1, 3 and 5. Pain index on 4th postop-	n=28 Pain index: median=0 (0-1.75), P<0.05	n=20 Pain index: median=5 (4-6), P<0.05	Pain index was 0 on postoperative day 4 in the LH group and 5 in the

Pain relief (descriptive data) (*Continued*)

	erative day (WHO scale).			AH group, LH was significantly less painful than AH.
Postoperative analgesics				
Falcone 1999	Length of time PCA pump was required (hours) and number of narcotic (oxycodone) or acetaminophen pills used in the hospital and after discharge was recorded.	n=23 PCA: Median=22.1 hours, range (15.9-23.5), P<0.001. Number of narcotics (in hospital): median=6, range (2.0-9.0), P=0.21. After discharge: median=19.5, range(2-26), P=0.28. Number of nonnarcotics (in hospital): median=0, range (0-4), P=0.36. After discharge: nedian=11, range (2-31), P=0.71.	n=21 PCA: Median= 36.7 hours, range (26.2-45), P<0.001. Number of narcotics (in hospital): Median=8.5, range (4-10) , P=0.21. After discharge: Median=8, range (0-23.5) , P=0.28. Number of nonnarcotics (in hospital): Median=0, range (0-3.5), P=0.004. After discharge: median= 13.5, range (1-66), P= 0.71	Participants in the LH group required less PCA time.
Ferrari 2000	Analgesic requirement recorded daily for 3 groups (number who require analgesia for more than 24 hours after surgery): 1)Whole series of participants; 2) Participants with uteri weighing under 500g and 3) uteri weighing greater than 500g.	Group 1: n=31. Median=7, n%=23, P<0.001. Group 2: n=20. Median= 1, n%=5, P=0.0001. Group 3: n= 11).Median= 6, n%=55.	Group 1: n=31. Median= 24, n%=77, P<0.001. Group 2: n=21. Median= 16, n%=76, P=0.0001. Group 3: n=10. Median= 8, n%=80.	LAVH was associated with a significantly lower administration of analgesics after the first 24 post-operative hours. Group 2, uteri weighing less than 500g, LAVH was associated with less analgesic administration.
Kluivers 2007	Number of participants receiving opoids during the first 3 days after surgery were recorded	n=27 Use of opoids: 10	n=32 Use of opoids: 22	Less women in LH versus AH group required opoids (p<0.01)
Langebrekke 1996	Number of participants receiving analgesics (parenterally, oral and rectal analgesics) during the hospital stay and 5 days postoperatively.	n=46 Data portrayed as bar chart.	n=54 Data portrayed as bar chart.	The need for both kinds of analgesics was reduced in the LH group.

Pain relief (descriptive data) (*Continued*)

Raju 1994	Duration of postoperative analgesia (days).	n=40 Median=6.6 days, range (0-23). P<0.0001.	n=40 Median=13.3 days, range (2-38). P<0.0001	Participants in the LAVH group required fewer days of analgesia than participants in the AH group.
Summitt 1998	Use of intramuscular narcotics and oral pain medication.	n=34 26 of the 34 participants required IM narcotics on the day of surgery. P= 0.018.	n=31 30 of the 31 participants required IM narcotics on the day of surgery. P =0.18	A statistically greater number of patients in the AH group required IM narcotics on the day of surgery compared to those in the LH group.
Recovery from pain (days)				
Raju 1994	Number of days until participants are free from pain.	n=40 Median=13 days, range (6-34). P<0.0001	n=40 Median=26 days, range (10-46) P<0.0001	Participants who had LAVH recovered from pain quicker than those who had AH.

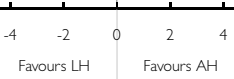
Analysis 2.14. Comparison 2 LH versus AH, Outcome 14 Length of hospital stay (days).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 2 LH versus AH

Outcome: 14 Length of hospital stay (days)

Study or subgroup	LH N	Mean(SD)	AH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Harkki-Siren 2000	25	2.1 (0.3)	25	3.4 (0.7)		27.2 %	-1.30 [-1.60, -1.00]
Kluivers 2007	27	4.2 (1.3)	32	5.4 (2.4)		2.6 %	-1.20 [-2.17, -0.23]
Kunz 1996	35	5 (0.85)	35	11 (2.86)		2.5 %	-6.00 [-6.99, -5.01]
Marana 1999	58	4 (1.2)	58	5.9 (2.3)		5.4 %	-1.90 [-2.57, -1.23]
Ollson 1996	71	2.5 (1.6)	72	5 (3.7)		2.8 %	-2.50 [-3.43, -1.57]
Ottosen 2000	40	3.1 (1.4)	40	3.7 (1)		8.5 %	-0.60 [-1.13, -0.07]
Perino 1999	51	2.4 (0.3)	51	6.2 (1.9)		8.7 %	-3.80 [-4.33, -3.27]
Seracchioli 2002	60	3.2 (1.3)	62	5.1 (1.7)		8.4 %	-1.90 [-2.44, -1.36]
Summitt 1998	34	2.12 (1.3)	31	4.13 (1.6)		4.8 %	-2.01 [-2.72, -1.30]



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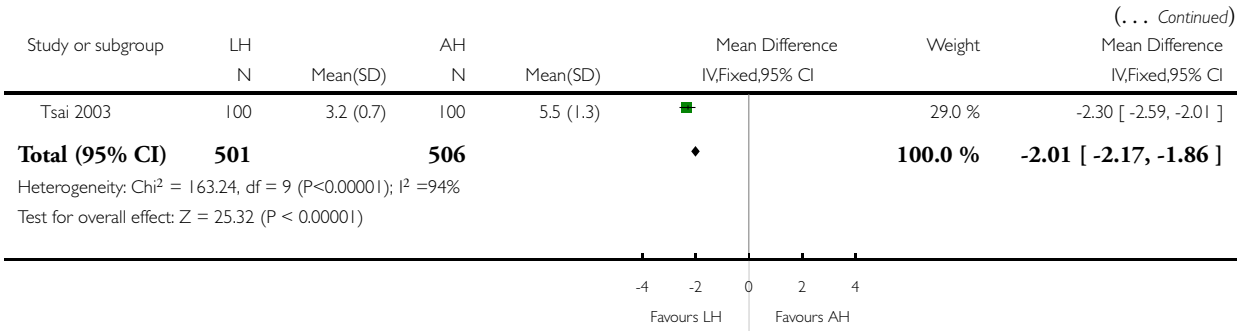


Analysis 2.15. Comparison 2 LH versus AH, Outcome 15 Length of hospital stay (descriptive data).

Length of hospital stay (descriptive data)

Study	LH	AH	Comments
Falcone 1999	n=23 median=1.5 days range (1.0-2.3)	n=21 median=2.5 days range (1.5-2.5)	P=0.038 Wilcoxon rank-sum test
Ferrari 2000	n=31 median=3.8 days range (3.8-4.0)	n=31 median=5.8 days range (5.3-6.3)	P<0.001
Garry 2004	n=584 median=3 days range (1-36)	n=292 median=4 days range (1-36)	
Hwang 2002	n=30 median=4.7 days range (3-7)	n=30 median=5 days range (4-8)	Not tested separately
Langebrekke 1996	n=46 median=2 days range (0-5)	n=54 median=5 days range (3-12)	P<0.001 Wilcoxon rank-sum test
Muzii 2007	n=40 median=2 days range (1-3)	n=41 median=3 days range=(1-5)	p=0.53
Persson 2006	n=63 median=2 days range (1-11)	n=56 median=3 days range (2-7)	p=0.0006
Raju 1994	n=40 median=3.5 days range (1-6)	n=40 median=6 days range (3-13)	P<0.0001 Mann-Whitney U test

Length of hospital stay (descriptive data) (*Continued*)

Ribiero 2003	n=20 all home on day 2	n=20 all home on day 3	
Schutz 2002	n=28 median=6.5 days range (5-7)	n=20 median=10 days range (8.25-11)	
Yuen 1998	n=20 median=4 days range (4-5)	n=24 median=6 days range (5-9)	P<0.001 Mann-Whitney U test

Analysis 2.16. Comparison 2 LH versus AH, Outcome 16 Cost (descriptive data).

Cost (descriptive data)

Study	**Description**	**LH**	**AH**	**Comments**
Ellstrom 1998	Analysis of cost over a period of 12 weeks, starting on the day the participant entered the hospital. Direct costs (hospital costs) and indirect costs (loss of production value) were analysed seperately. Units of currency= Swedish crowns (SEK).	n=38 Direct costs (average)= SEK23,169. Indirect costs (average) = SEK10,314.	n=38 Direct costs (average)= SEK22,780. Indirect costs (average)=SEK20,743.	The change in costs between LH and AH are negligible as approximately 50% of hospital costs are fixed costs.
Falcone 1999	Hospital costs (amount a provider must pay for goods and services) were assessed through the hospital accounting system. The direct and indirect costs were calculated for each patient from 3 different components: operating room costs, anaesthesia costs and ward costs.	n=24 Difference in medians (LH-AH): total hospital costs = $277, CI= (-163, 1097), P=0.21	n=24 (see LH)	Total hospital costs were not significantly higher in the LH group than the AH group.
Lumsden 2000	Single set of unit costs applied to each unit of resource to provide a NHS cost for each woman. 1997/98 prices.	n=95 Total cost (operation, inpatient stay and readmissions): median=£2112, mean=£2479. Cost excluding disposables: median= £1740, mean=£2173.	n=95 Total cost: median=£1667, mean=£1832. Cost excluding disposables: median=£1667, mean=£1832	AH had significantly lower total costs than LH, resulting principally from the difference in operation costs. When the cost of disposable equipment was removed, the difference was non-significant.

Cost (descriptive data) (*Continued*)

Raju 1994	Cost analysis of each type of procedure on the major points of difference between either operation: cost of disposable consumerables and the comparative costs of post-operative lengths of stay in hospital.	n=40 Cost of operation (average) =£225. Cost of mean length of stay including operation time and cost of disposable instruments=£1260.	n=40 Cost of operation (average) =£30. Cost of mean length of stay including operation time and cost of disposable instruments=£1750.	
Summitt 1998	Hospital charges for both groups.	n=34 Mean= $8161, sd=3600, range (3061-23,591). P>0.05	n=31 Mean= $6974, sd=2843, range (3183-16,086). P>0.05	Lack of a statistical difference in total hospital charges.

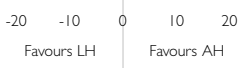
Analysis 3.1. Comparison 3 LH subcategory analyses versus AH, Outcome 1 Return to normal activities (days).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 1 Return to normal activities (days)

Study or subgroup	LH N	Mean(SD)	AH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 LAVH versus AH							
Ottosen 2000	40	19.7 (7.5)	40	28.1 (9.5)		22.7 %	-8.40 [-12.15, -4.65]
Subtotal (95% CI)	**40**		**40**			**22.7 %**	**-8.40 [-12.15, -4.65]**
Heterogeneity: not applicable							
Test for overall effect: Z = 4.39 (P = 0.000011)							
2 LH(a) versus AH							
Harkki-Siren 2000	25	21.4 (6.7)	25	38.5 (5.7)		26.9 %	-17.10 [-20.55, -13.65]
Hwang 2002	30	30 (16)	30	41 (10)		7.0 %	-11.00 [-17.75, -4.25]
Ollson 1996	71	18 (11)	72	36.2 (16.2)		15.6 %	-18.20 [-22.73, -13.67]
Seracchioli 2002	60	22 (11.3)	62	36 (12.1)		18.5 %	-14.00 [-18.15, -9.85]
Summitt 1998	34	28 (13.3)	31	38 (10.8)		9.3 %	-10.00 [-15.87, -4.13]
Subtotal (95% CI)	**220**		**220**			**77.3 %**	**-15.17 [-17.21, -13.14]**
Heterogeneity: Chi^2 = 7.67, df = 4 (P = 0.10); I^2 =48%							



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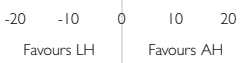
Study or subgroup	LH N	Mean(SD)	AH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Test for overall effect: Z = 14.62 (P < 0.00001)							
3 TLH versus AH							
Subtotal (95% CI)	**0**		**0**			**0.0 %**	**0.0 [0.0, 0.0]**
Heterogeneity: not applicable							
Test for overall effect: not applicable							
4 Non-categorisable LH versus AH							
Subtotal (95% CI)	**0**		**0**			**0.0 %**	**0.0 [0.0, 0.0]**
Heterogeneity: not applicable							
Test for overall effect: not applicable							
Total (95% CI)	**260**		**260**			**100.0 %**	**-13.63 [-15.42, -11.84]**
Heterogeneity: Chi^2 = 17.35, df = 5 (P = 0.004); I^2 =71%							
Test for overall effect: Z = 14.94 (P < 0.00001)							
Test for subgroup differences: Chi^2 = 9.67, df = 1 (P = 0.00), I^2 =90%							



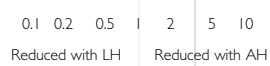
Analysis 3.2. Comparison 3 LH subcategory analyses versus AH, Outcome 2 Satisfaction.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 2 Satisfaction

Study or subgroup	LH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus AH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
2 LH(a) versus AH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
3 TLH versus AH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)					
Heterogeneity: not applicable					



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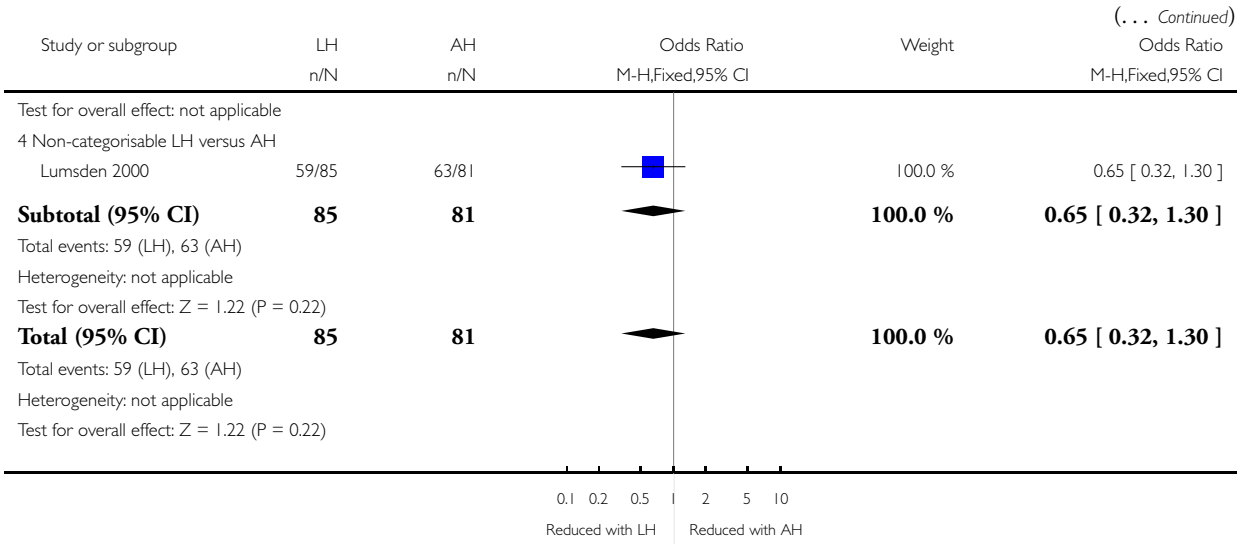
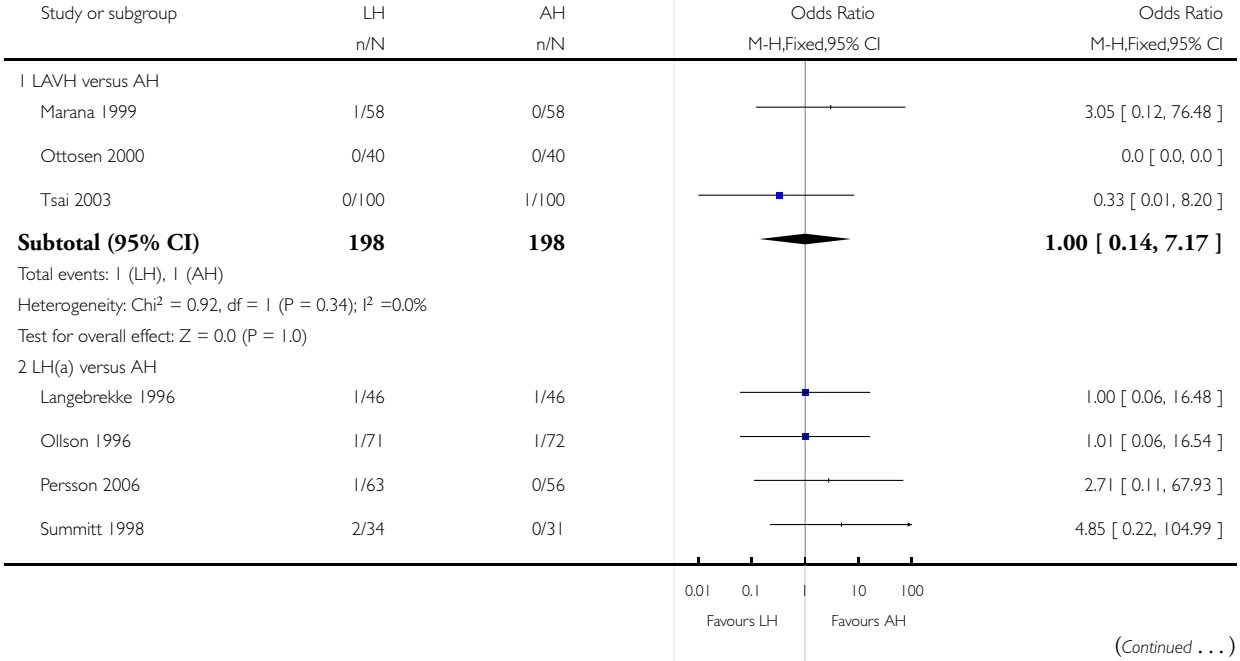


Analysis 3.3. Comparison 3 LH subcategory analyses versus AH, Outcome 3 Bladder injury.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 3 Bladder injury



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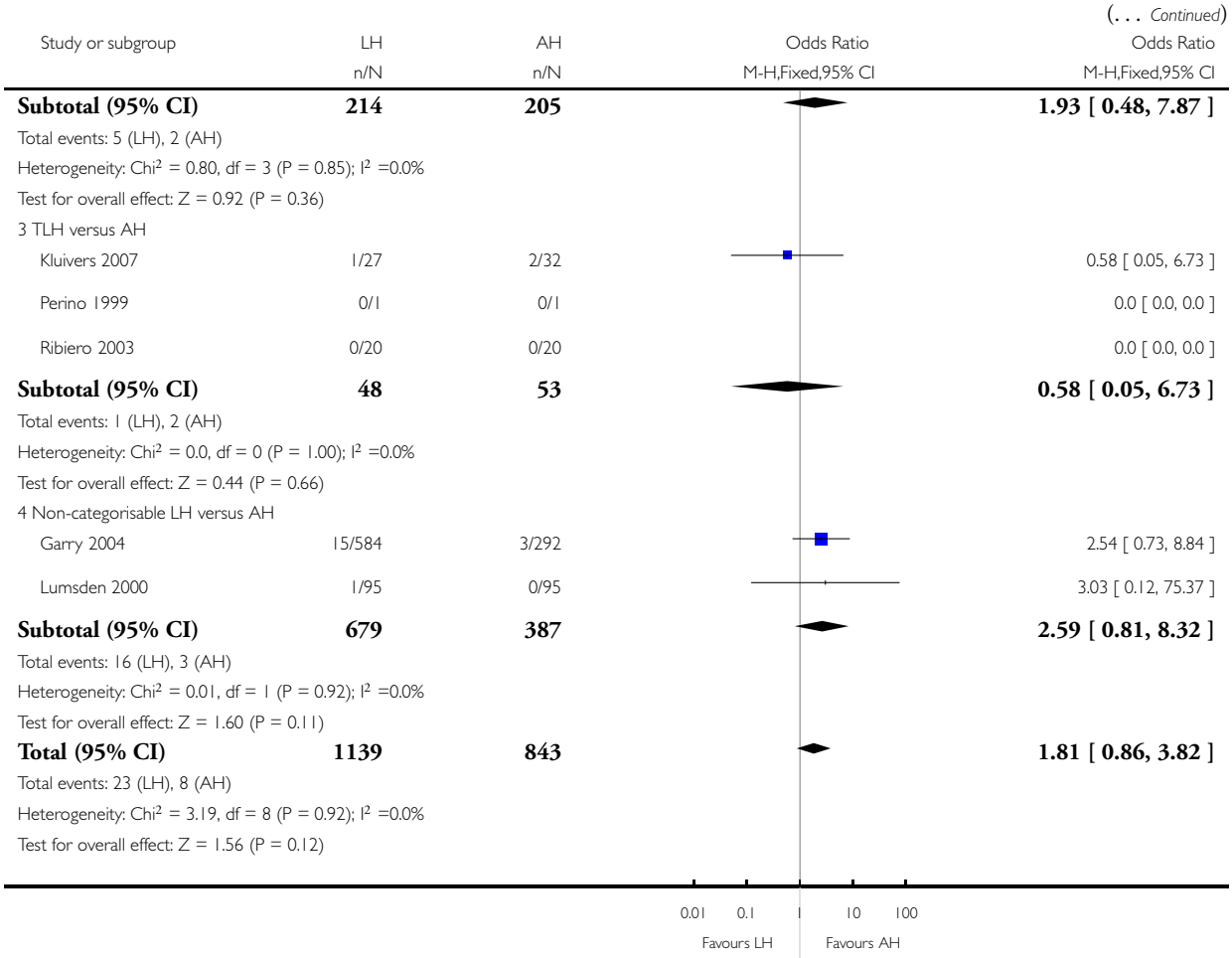


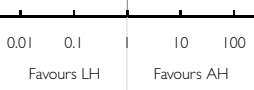
Analysis 3.4. Comparison 3 LH subcategory analyses versus AH, Outcome 4 Ureter injury.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 4 Ureter injury

Study or subgroup	LH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus AH				
Subtotal (95% CI)	**0**	**0**		**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)				
Heterogeneity: not applicable				
Test for overall effect: not applicable				
2 LH(a) versus AH				
Langebrekke 1996	2/46	0/54		6.12 [0.29, 130.87]
Subtotal (95% CI)	**46**	**54**		**6.12 [0.29, 130.87]**
Total events: 2 (LH), 0 (AH)				
Heterogeneity: not applicable				
Test for overall effect: Z = 1.16 (P = 0.25)				
3 TLH versus AH				
Kluivers 2007	1/27	0/32		3.68 [0.14, 94.08]
Perino 1999	1/51	0/51		3.06 [0.12, 76.88]
Ribiero 2003	0/20	0/20		0.0 [0.0, 0.0]
Subtotal (95% CI)	**98**	**103**		**3.35 [0.34, 32.97]**
Total events: 2 (LH), 0 (AH)				
Heterogeneity: Chi^2 = 0.01, df = 1 (P = 0.94); I^2 =0.0%				
Test for overall effect: Z = 1.04 (P = 0.30)				
4 Non-categorisable LH versus AH				
Garry 2004	5/584	0/292		5.55 [0.31, 100.75]
Lumsden 2000	1/95	1/95		1.00 [0.06, 16.22]
Subtotal (95% CI)	**679**	**387**		**2.82 [0.44, 18.03]**
Total events: 6 (LH), 1 (AH)				
Heterogeneity: Chi^2 = 0.74, df = 1 (P = 0.39); I^2 =0.0%				
Test for overall effect: Z = 1.10 (P = 0.27)				
Total (95% CI)	**823**	**544**		**3.46 [0.94, 12.71]**
Total events: 10 (LH), 1 (AH)				
Heterogeneity: Chi^2 = 1.01, df = 4 (P = 0.91); I^2 =0.0%				
Test for overall effect: Z = 1.87 (P = 0.061)				



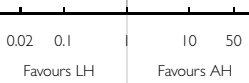
Analysis 3.5. Comparison 3 LH subcategory analyses versus AH, Outcome 5 Bowel injury.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 5 Bowel injury

Study or subgroup	LH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus AH				
Subtotal (95% CI)	**0**	**0**		**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)				
Heterogeneity: not applicable				
Test for overall effect: not applicable				
2 LH(a) versus AH				
Subtotal (95% CI)	**0**	**0**		**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)				
Heterogeneity: not applicable				
Test for overall effect: not applicable				
3 TLH versus AH				
Kluivers 2007	0/27	0/32		0.0 [0.0, 0.0]
Subtotal (95% CI)	**27**	**32**		**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)				
Heterogeneity: not applicable				
Test for overall effect: Z = 0.0 (P < 0.00001)				
4 Non-categorisable LH versus AH				
Garry 2004	1/584	3/292		0.17 [0.02, 1.60]
Lumsden 2000	0/95	0/95		0.0 [0.0, 0.0]
Subtotal (95% CI)	**679**	**387**		**0.17 [0.02, 1.60]**
Total events: 1 (LH), 3 (AH)				
Heterogeneity: Chi^2 = 0.0, df = 0 (P = 1.00); I^2 =0.0%				
Test for overall effect: Z = 1.56 (P = 0.12)				
Total (95% CI)	**706**	**419**		**0.17 [0.02, 1.60]**
Total events: 1 (LH), 3 (AH)				
Heterogeneity: Chi^2 = 0.0, df = 0 (P = 1.00); I^2 =0.0%				
Test for overall effect: Z = 1.56 (P = 0.12)				

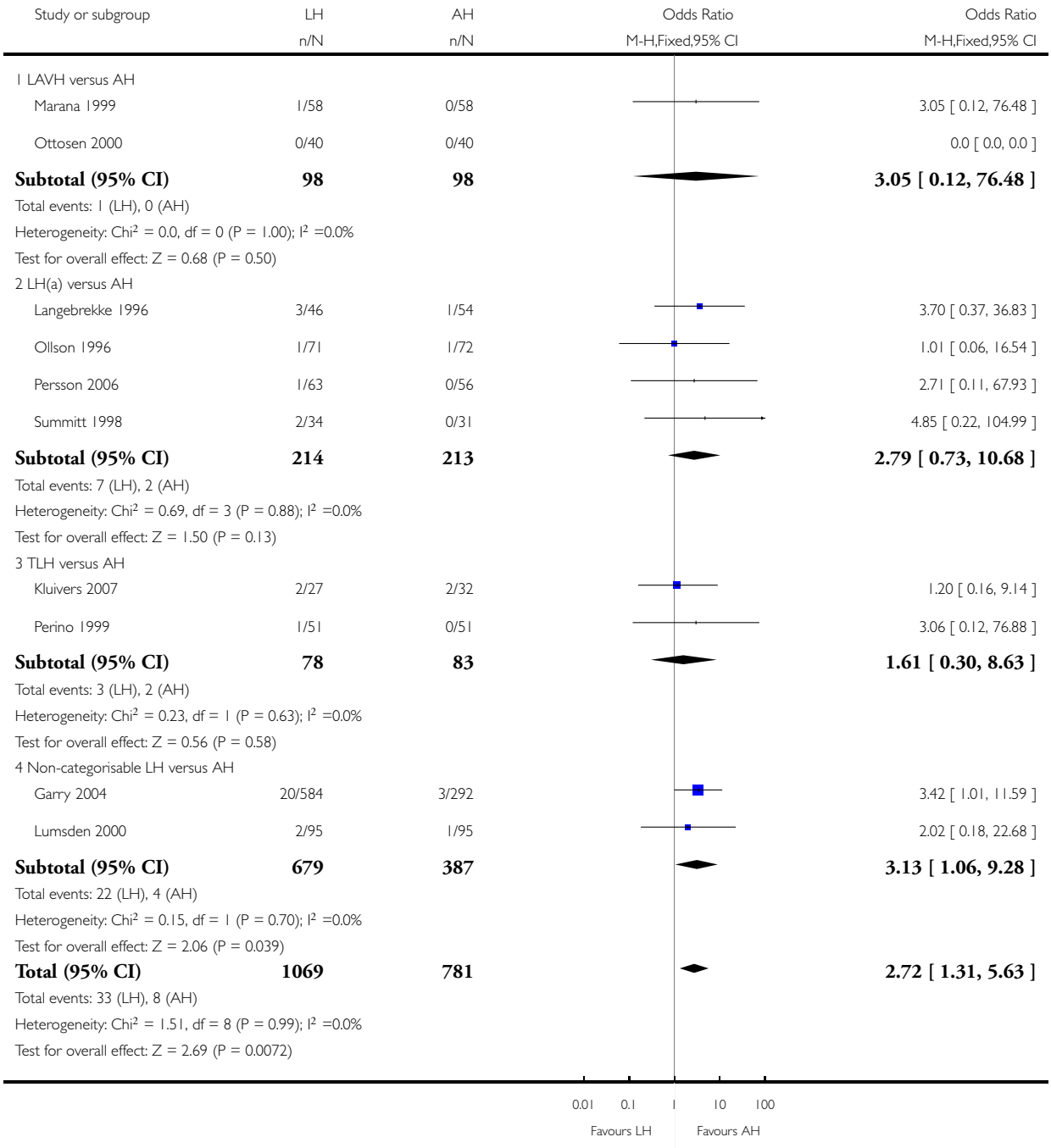


Analysis 3.6. Comparison 3 LH subcategory analyses versus AH, Outcome 6 Urinary tract (bladder or ureter) injury.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 6 Urinary tract (bladder or ureter) injury

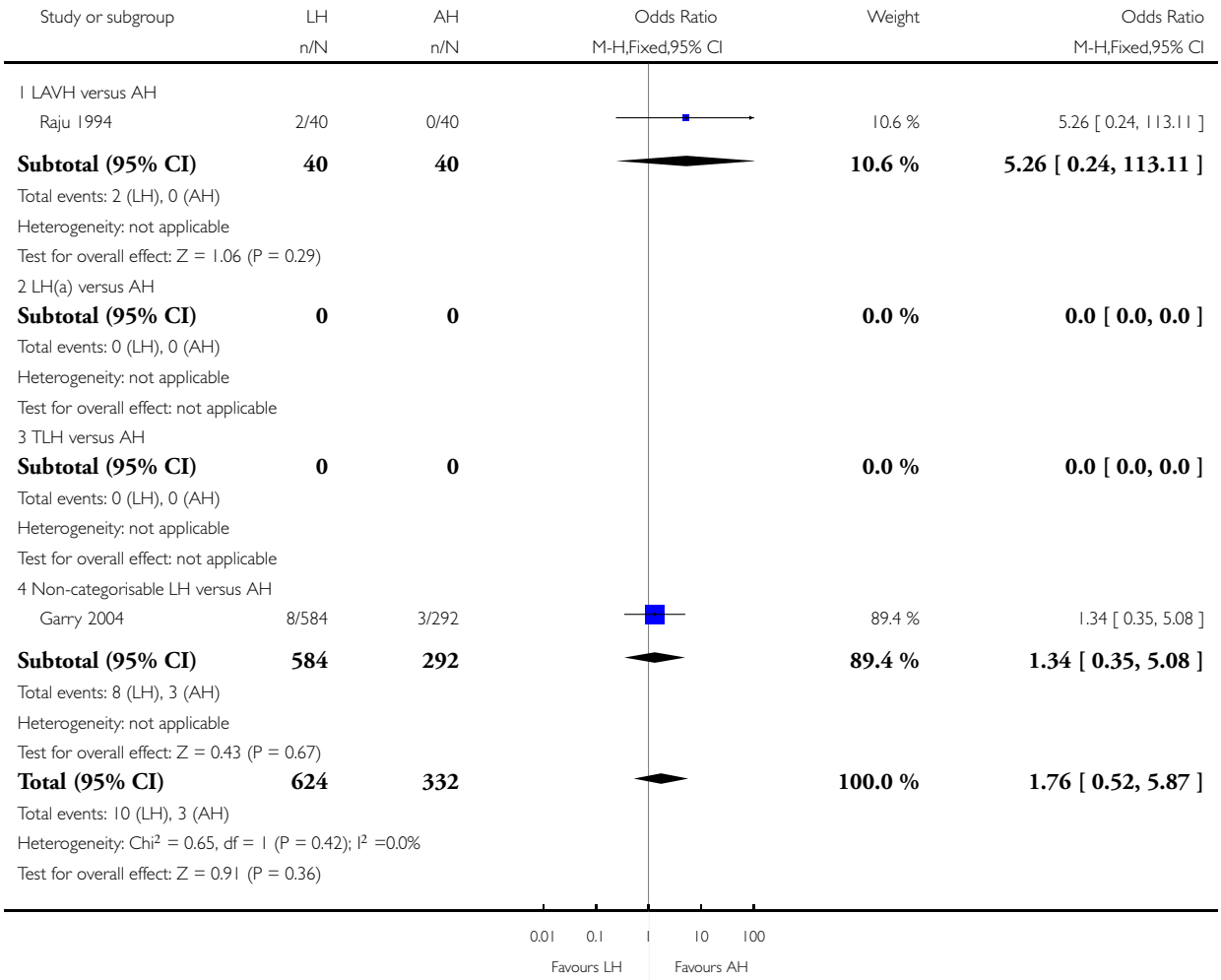


Analysis 3.7. Comparison 3 LH subcategory analyses versus AH, Outcome 7 Vascular injury.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 7 Vascular injury



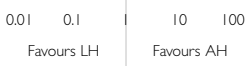
Analysis 3.8. Comparison 3 LH subcategory analyses versus AH, Outcome 8 Fistula.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 8 Fistula

Study or subgroup	LH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus AH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
2 LH(a) versus AH					
Ollson 1996	1/71	0/72		50.0 %	3.09 [0.12, 77.01]
Subtotal (95% CI)	**71**	**72**		**50.0 %**	**3.09 [0.12, 77.01]**
Total events: 1 (LH), 0 (AH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.69 (P = 0.49)					
3 TLH versus AH					
Perino 1999	1/51	0/51		50.0 %	3.06 [0.12, 76.88]
Subtotal (95% CI)	**51**	**51**		**50.0 %**	**3.06 [0.12, 76.88]**
Total events: 1 (LH), 0 (AH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.68 (P = 0.50)					
4 Non-categorisable LH versus AH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
Total (95% CI)	**122**	**123**		**100.0 %**	**3.07 [0.32, 29.96]**
Total events: 2 (LH), 0 (AH)					
Heterogeneity: Chi^2 = 0.00, df = 1 (P = 1.00); I^2 =0.0%					
Test for overall effect: Z = 0.97 (P = 0.33)					

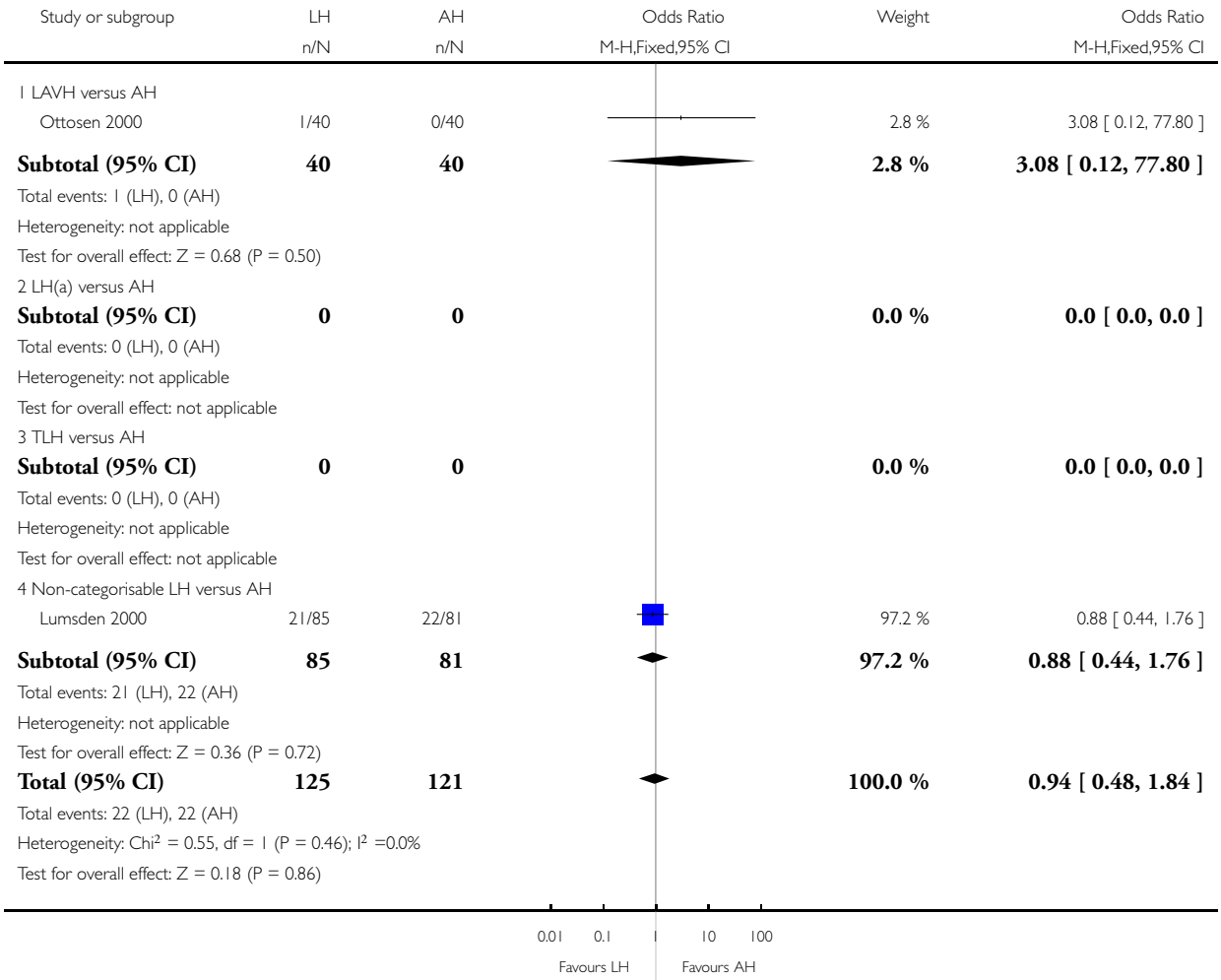


Analysis 3.9. Comparison 3 LH subcategory analyses versus AH, Outcome 9 Urinary dysfunction.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 9 Urinary dysfunction

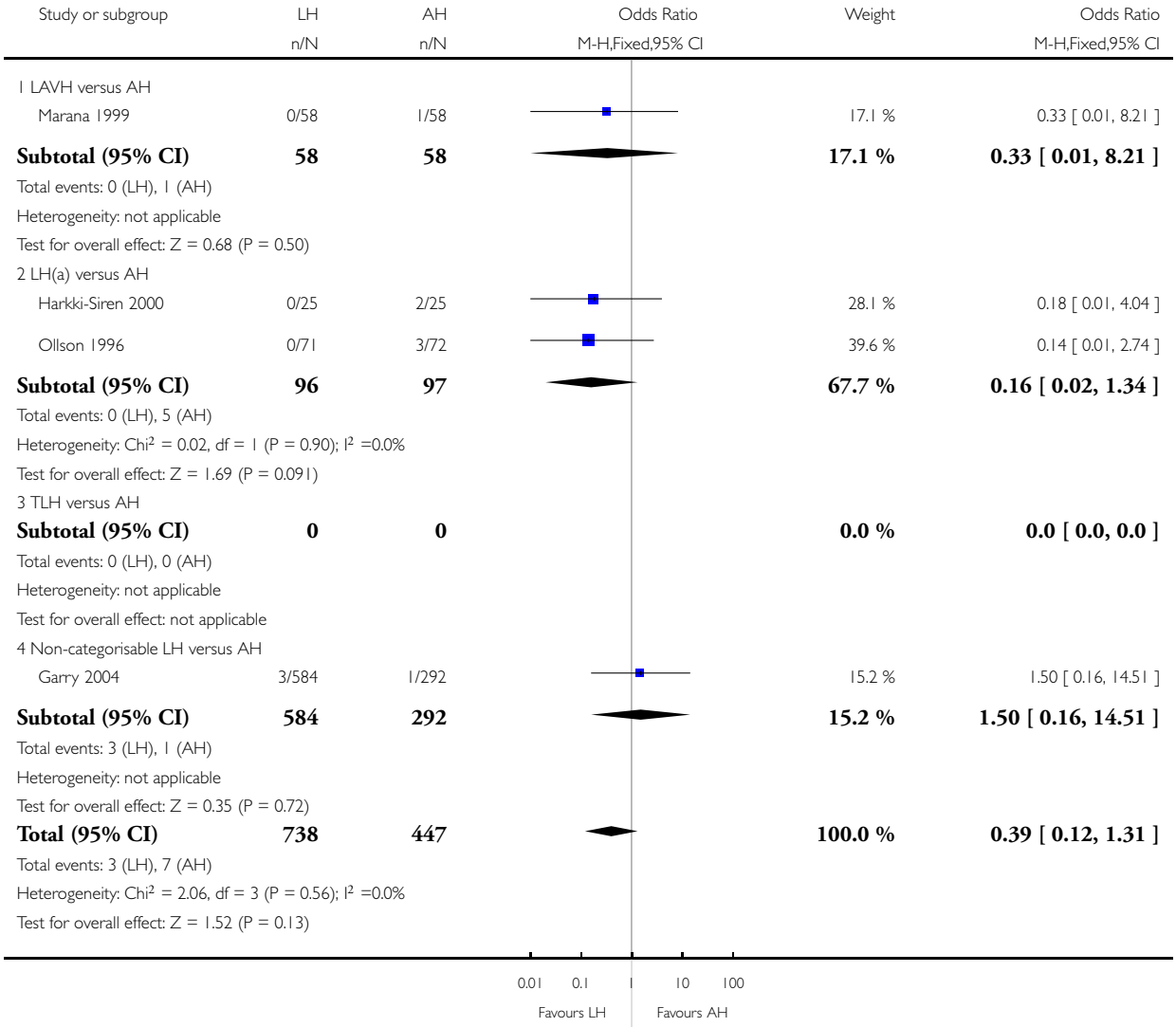


Analysis 3.10. Comparison 3 LH subcategory analyses versus AH, Outcome 10 Bleeding.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 10 Bleeding

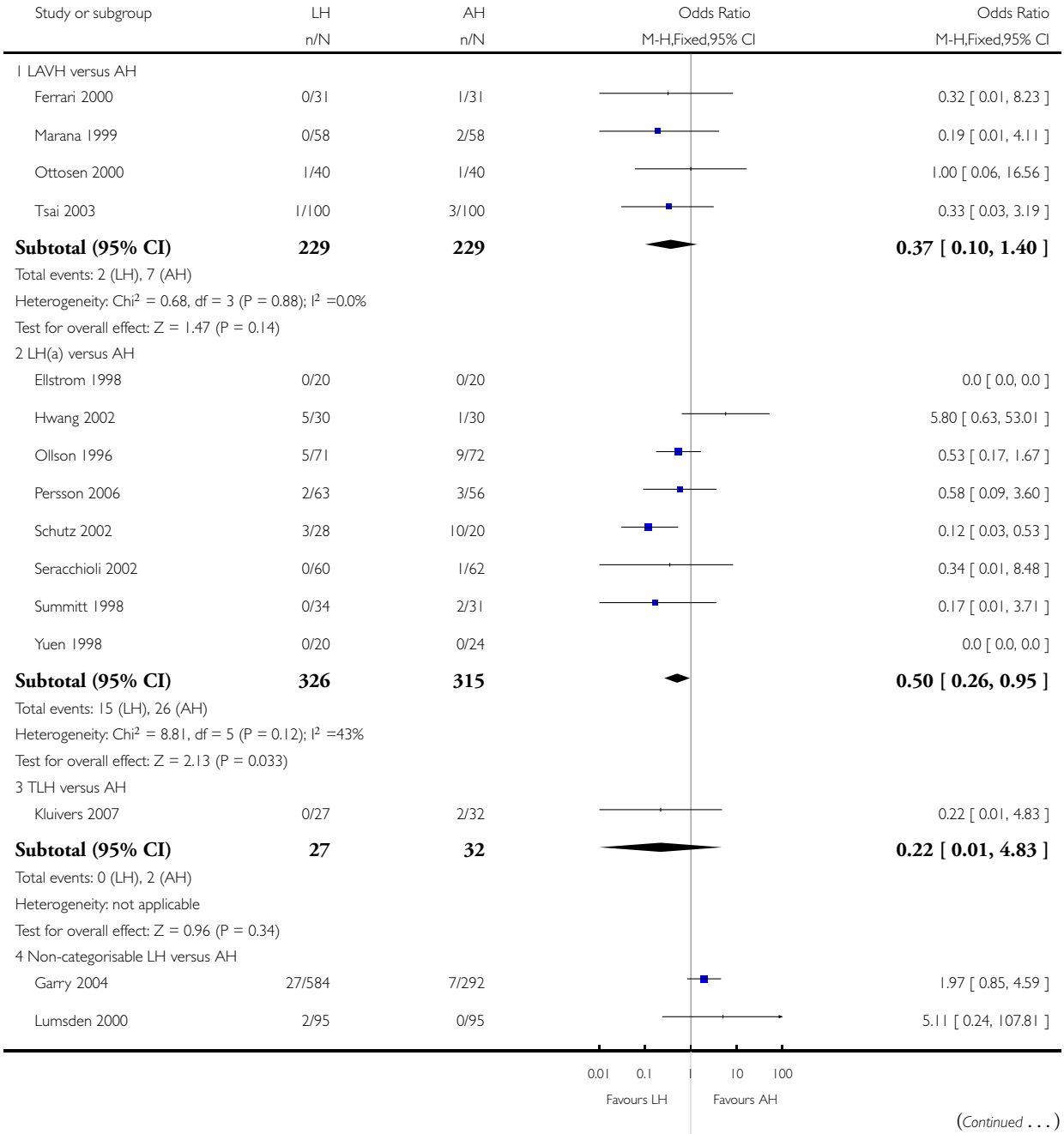


Analysis 3.11. Comparison 3 LH subcategory analyses versus AH, Outcome 11 Transfusion.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 11 Transfusion



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Study or subgroup	LH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Odds Ratio M-H,Fixed,95% CI
Subtotal (95% CI)	**679**	**387**		**2.14 [0.95, 4.81]**
Total events: 29 (LH), 7 (AH)				
Heterogeneity: Chi² = 0.35, df = 1 (P = 0.56); I² =0.0%				
Test for overall effect: Z = 1.83 (P = 0.067)				
Total (95% CI)	**1261**	**963**		**0.79 [0.52, 1.22]**
Total events: 46 (LH), 42 (AH)				
Heterogeneity: Chi² = 19.44, df = 12 (P = 0.08); I² =38%				
Test for overall effect: Z = 1.06 (P = 0.29)				

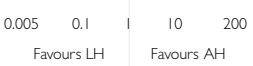
Analysis 3.12. Comparison 3 LH subcategory analyses versus AH, Outcome 12 Pelvic haematoma.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 12 Pelvic haematoma

Study or subgroup	LH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus AH					
Marana 1999	0/58	1/58		8.0 %	0.33 [0.01, 8.21]
Ottosen 2000	0/40	1/40		8.0 %	0.33 [0.01, 8.22]
Raju 1994	0/40	1/40		8.0 %	0.33 [0.01, 8.22]
Subtotal (95% CI)	**138**	**138**		**24.0 %**	**0.33 [0.05, 2.10]**
Total events: 0 (LH), 3 (AH)					
Heterogeneity: Chi² = 0.00, df = 2 (P = 1.00); I² =0.0%					
Test for overall effect: Z = 1.18 (P = 0.24)					
2 LH(a) versus AH					
Langebrekke 1996	3/46	6/54		27.8 %	0.56 [0.13, 2.37]
Ollson 1996	6/71	5/72		24.5 %	1.24 [0.36, 4.25]
Persson 2006	0/63	3/56		19.8 %	0.12 [0.01, 2.38]
Yuen 1998	4/20	1/24		3.9 %	5.75 [0.59, 56.35]
Subtotal (95% CI)	**200**	**206**		**76.0 %**	**0.93 [0.44, 1.97]**
Total events: 13 (LH), 15 (AH)					
Heterogeneity: Chi² = 4.93, df = 3 (P = 0.18); I² =39%					



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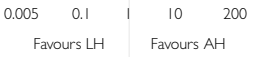
Study or subgroup	LH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
Test for overall effect: Z = 0.19 (P = 0.85)					
3 TLH versus AH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
4 Non-categorisable LH versus AH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
Total (95% CI)	**338**	**344**		**100.0 %**	**0.79 [0.40, 1.56]**
Total events: 13 (LH), 18 (AH)					
Heterogeneity: Chi² = 6.03, df = 6 (P = 0.42); I² =0%					
Test for overall effect: Z = 0.69 (P = 0.49)					



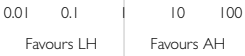
Analysis 3.13. Comparison 3 LH subcategory analyses versus AH, Outcome 13 Vaginal cuff infection.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 13 Vaginal cuff infection

Study or subgroup	LH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus AH				
Marana 1999	0/58	1/58		0.33 [0.01, 8.21]
Ottosen 2000	1/40	0/40		3.08 [0.12, 77.80]
Tsai 2003	1/100	2/100		0.49 [0.04, 5.55]
Subtotal (95% CI)	**198**	**198**		**0.75 [0.17, 3.37]**
Total events: 2 (LH), 3 (AH)				
Heterogeneity: Chi² = 1.10, df = 2 (P = 0.58); I² =0.0%				
Test for overall effect: Z = 0.38 (P = 0.70)				
2 LH(a) versus AH				
Ellstrom 1998	0/20	1/20		0.32 [0.01, 8.26]



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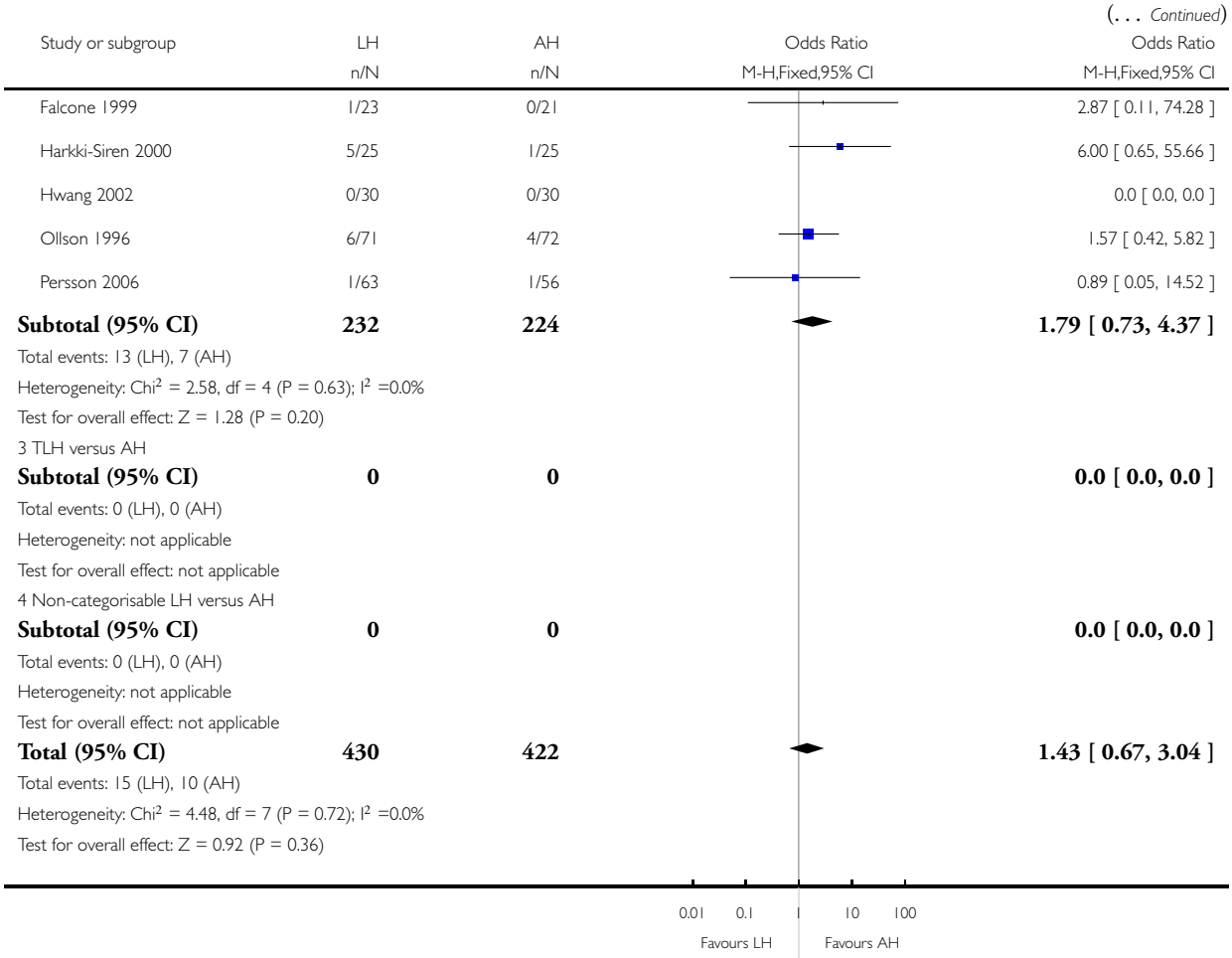
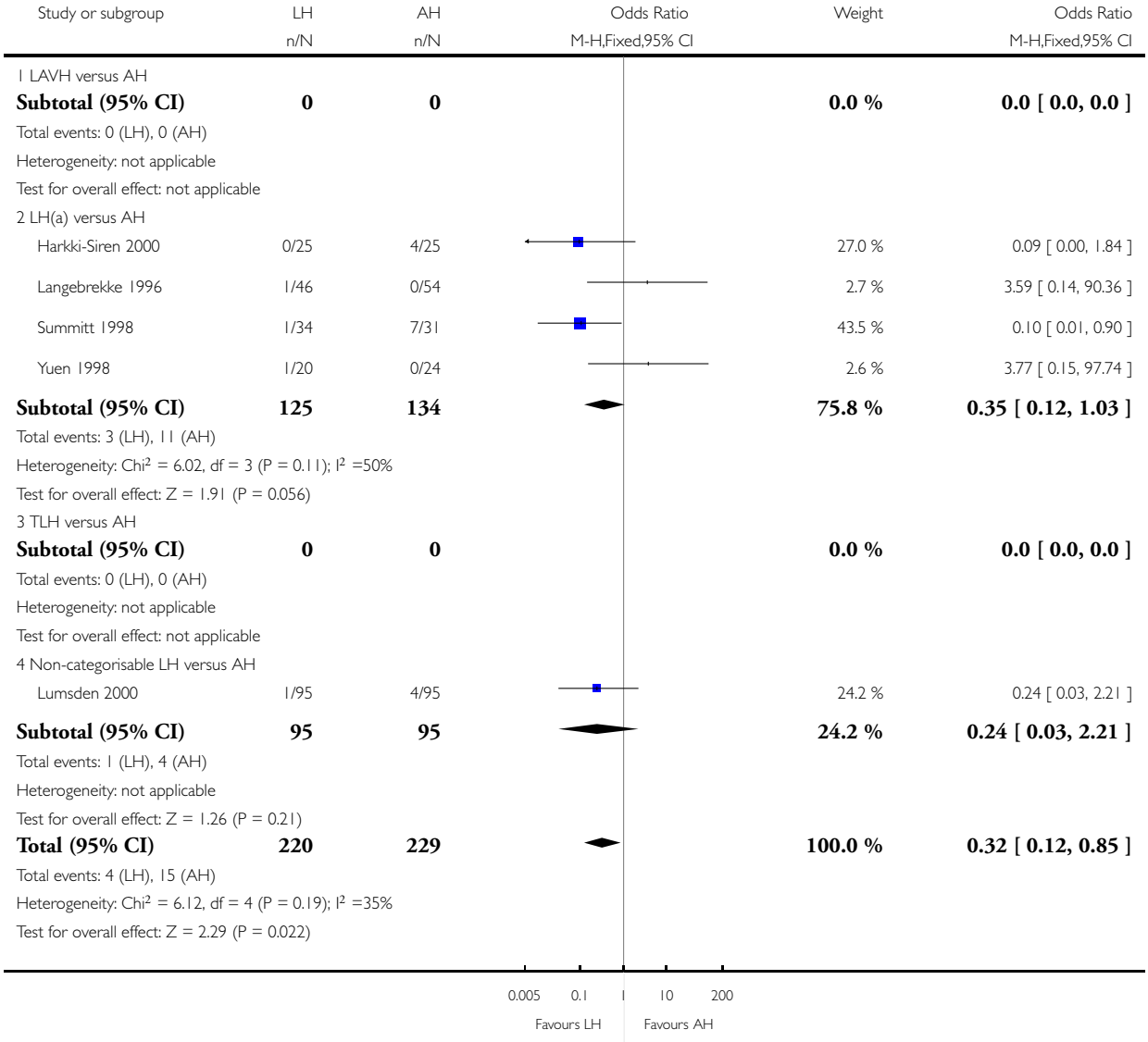


Analysis 3.14. Comparison 3 LH subcategory analyses versus AH, Outcome 14 Wound/abdominal wall infection.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 14 Wound/abdominal wall infection

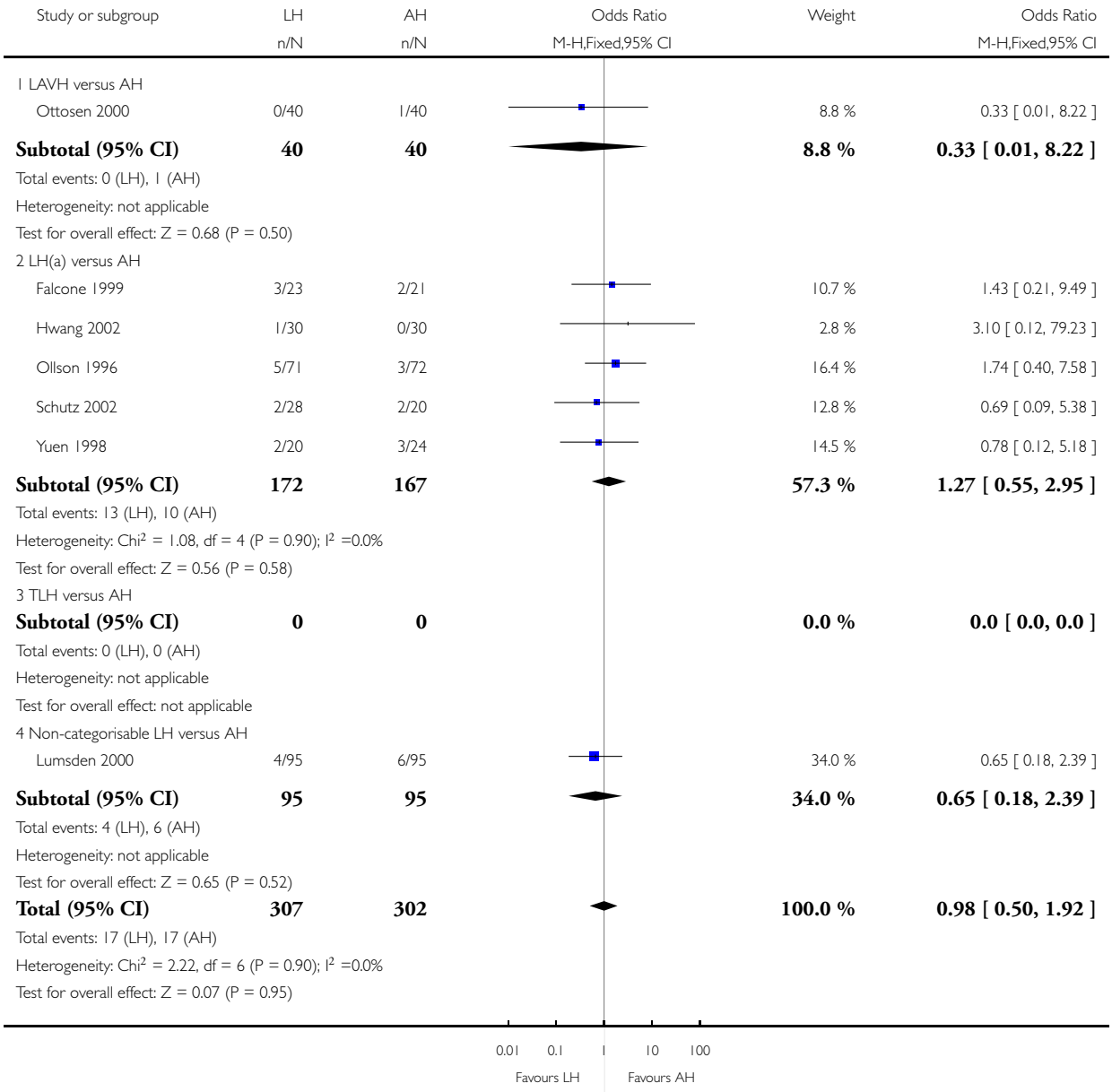


Analysis 3.15. Comparison 3 LH subcategory analyses versus AH, Outcome 15 Urinary tract infection.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 15 Urinary tract infection

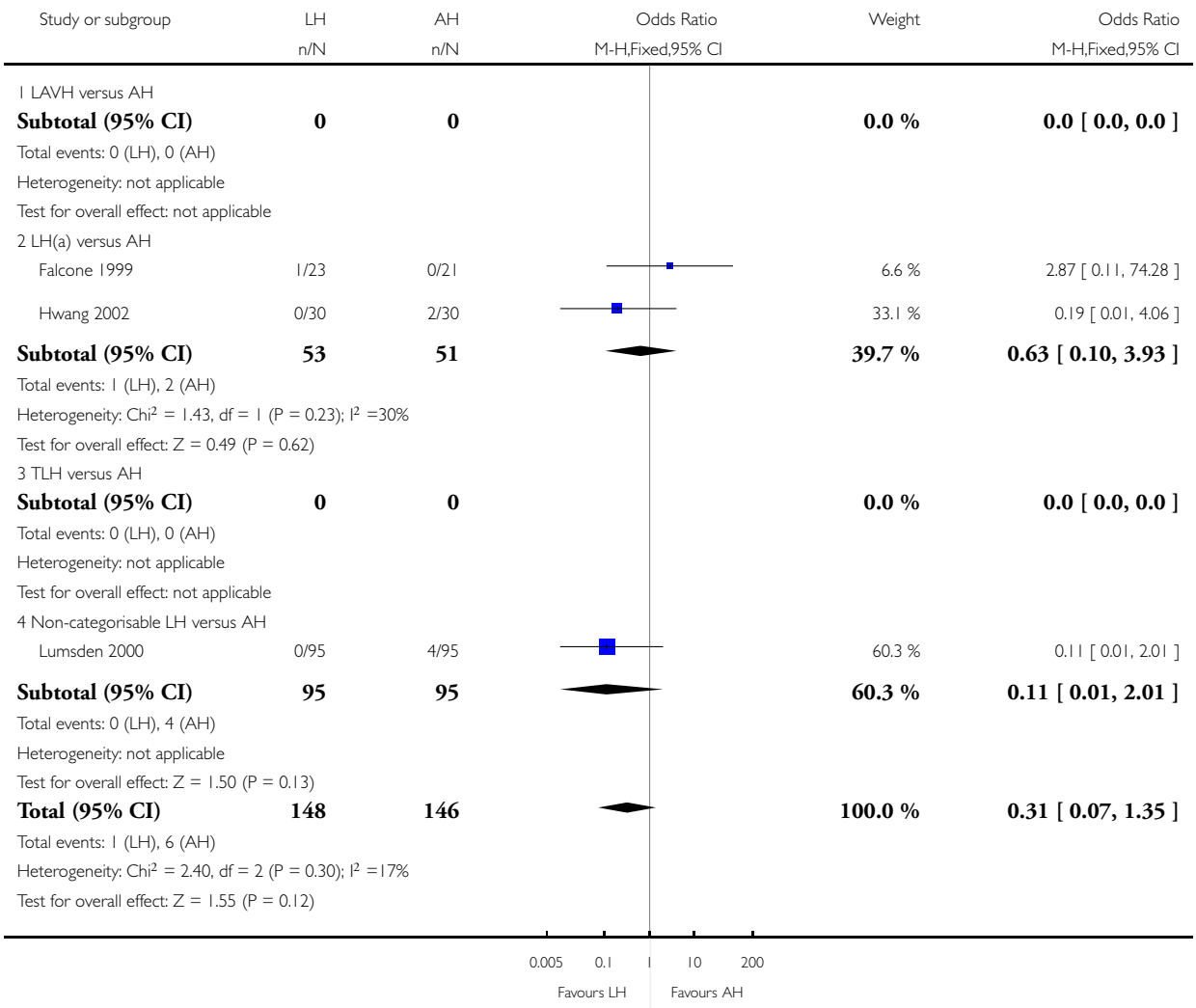


Analysis 3.16. Comparison 3 LH subcategory analyses versus AH, Outcome 16 Chest infection.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 16 Chest infection

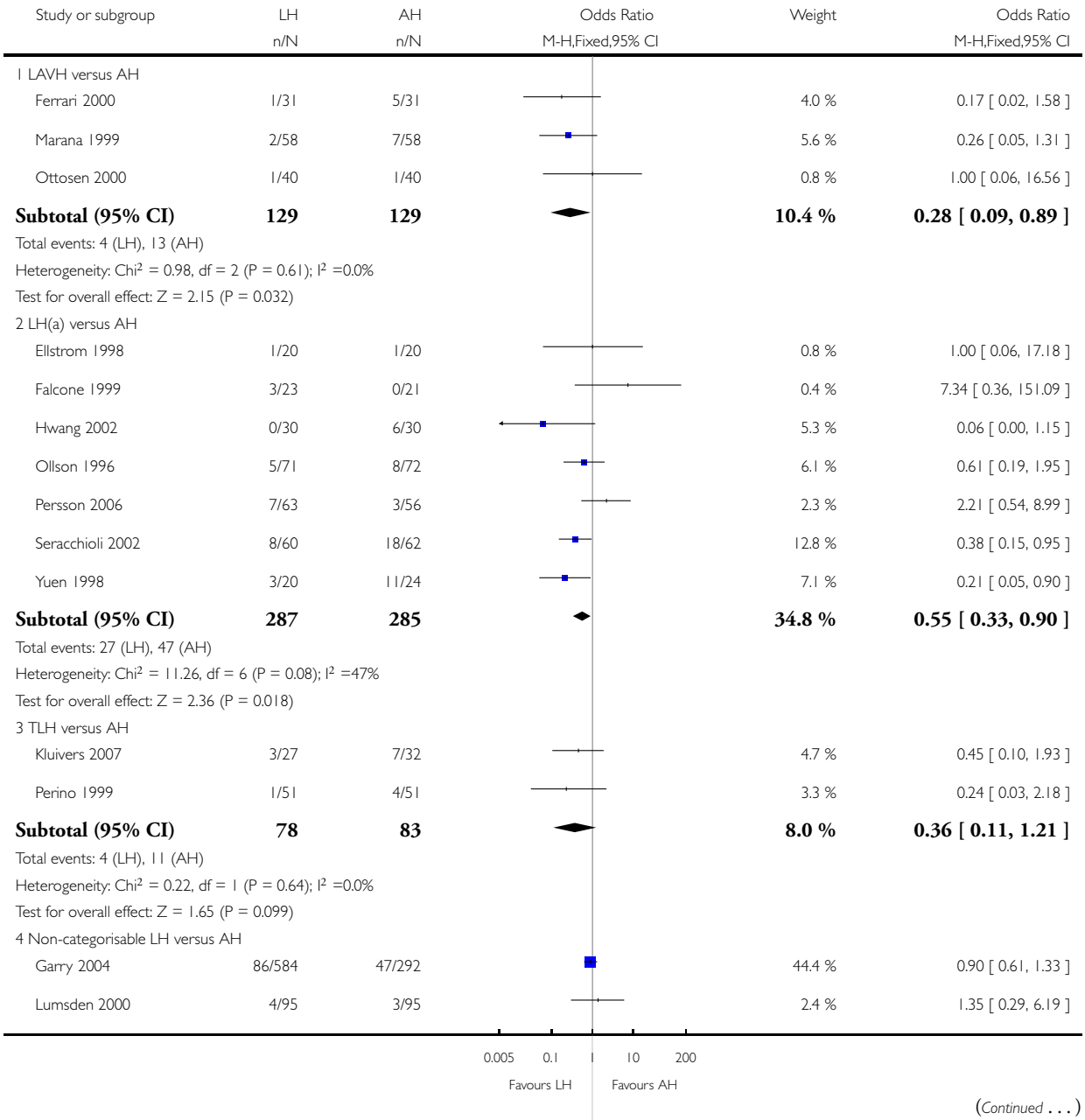


Analysis 3.17. Comparison 3 LH subcategory analyses versus AH, Outcome 17 Febrile episodes or unspecified infection.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 17 Febrile episodes or unspecified infection



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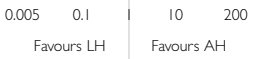
Study or subgroup	LH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
Subtotal (95% CI)	**679**	**387**		**46.8 %**	**0.92 [0.63, 1.34]**
Total events: 90 (LH), 50 (AH)					
Heterogeneity: Chi² = 0.25, df = 1 (P = 0.61); I² =0.0%					
Test for overall effect: Z = 0.42 (P = 0.68)					
Total (95% CI)	**1173**	**884**		**100.0 %**	**0.68 [0.52, 0.90]**
Total events: 125 (LH), 121 (AH)					
Heterogeneity: Chi² = 18.72, df = 13 (P = 0.13); I² =31%					
Test for overall effect: Z = 2.73 (P = 0.0063)					



Analysis 3.18. Comparison 3 LH subcategory analyses versus AH, Outcome 18 Thromboembolism.

Review: Surgical approach to hysterectomy for benign gynaecological disease
Comparison: 3 LH subcategory analyses versus AH
Outcome: 18 Thromboembolism

Study or subgroup	LH n/N	AH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus AH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
2 LH(a) versus AH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (AH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
3 TLH versus AH					
Kluivers 2007	0/27	1/32		30.1 %	0.38 [0.01, 9.76]
Subtotal (95% CI)	**27**	**32**		**30.1 %**	**0.38 [0.01, 9.76]**
Total events: 0 (LH), 1 (AH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.58 (P = 0.56)					
4 Non-categorisable LH versus AH					
Garry 2004	3/584	2/292		59.0 %	0.75 [0.12, 4.51]

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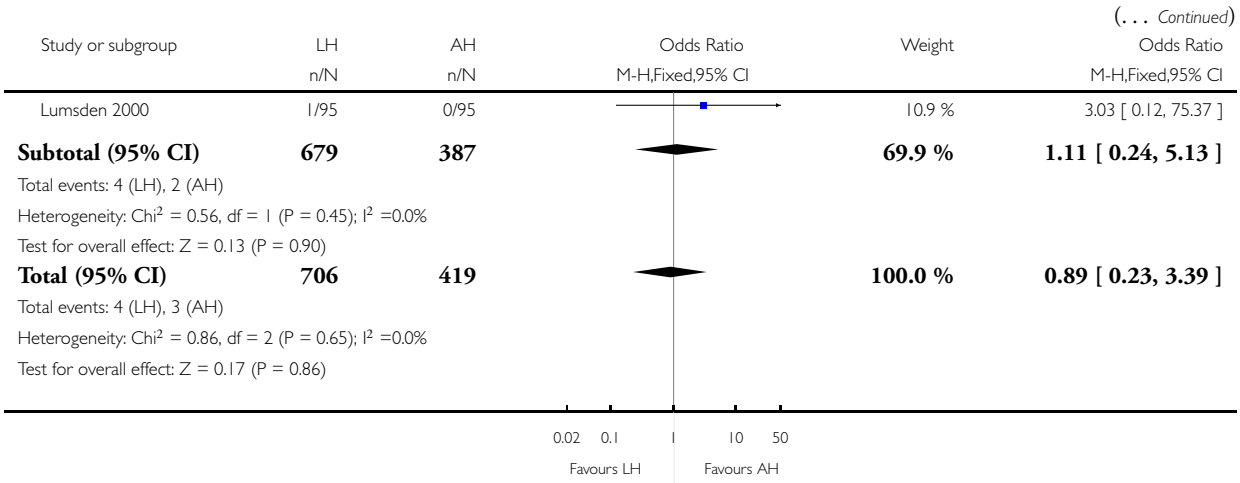
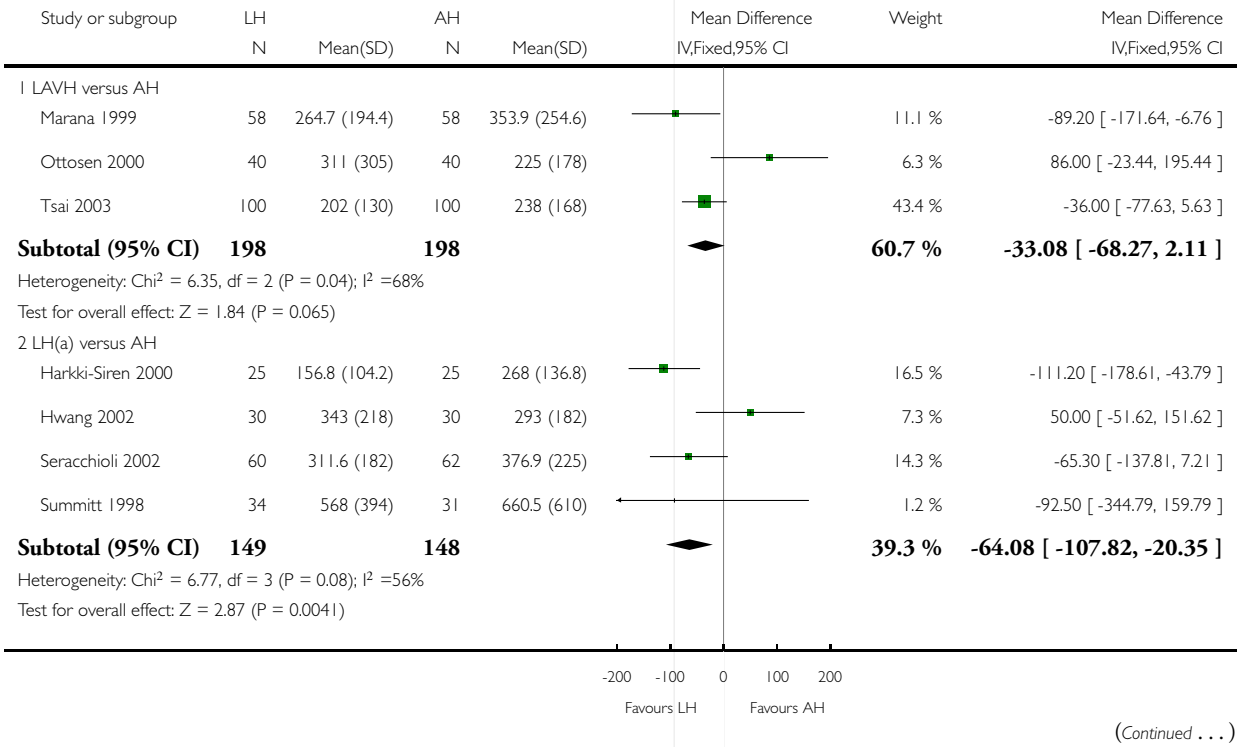


Analysis 3.19. Comparison 3 LH subcategory analyses versus AH, Outcome 19 Estimated blood loss.

Review: Surgical approach to hysterectomy for benign gynaecological disease
Comparison: 3 LH subcategory analyses versus AH
Outcome: 19 Estimated blood loss



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Study or subgroup	LH N	LH Mean(SD)	AH N	AH Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
3 TLH versus AH							
Subtotal (95% CI)	**0**		**0**			**0.0 %**	**0.0 [0.0, 0.0]**
Heterogeneity: not applicable							
Test for overall effect: not applicable							
4 Non-categorisable LH versus AH							
Subtotal (95% CI)	**0**		**0**			**0.0 %**	**0.0 [0.0, 0.0]**
Heterogeneity: not applicable							
Test for overall effect: not applicable							
Total (95% CI)	**347**		**346**			**100.0 %**	**-45.26 [-72.68, -17.85]**
Heterogeneity: Chi² = 14.29, df = 6 (P = 0.03); I² =58%							
Test for overall effect: Z = 3.24 (P = 0.0012)							
Test for subgroup differences: Chi² = 1.17, df = 1 (P = 0.28), I² =15%							

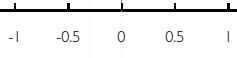
Analysis 3.20. Comparison 3 LH subcategory analyses versus AH, Outcome 20 Drop in haemoglobin.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 20 Drop in haemoglobin

Study or subgroup	LH N	LH Mean(SD)	AH N	AH Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 LAVH versus AH							
Marana 1999	58	1.09 (0.97)	58	1.55 (1.07)		52.7 %	-0.46 [-0.83, -0.09]
Subtotal (95% CI)	**58**		**58**			**52.7 %**	**-0.46 [-0.83, -0.09]**
Heterogeneity: not applicable							
Test for overall effect: Z = 2.43 (P = 0.015)							
2 LH(a) versus AH							
Harkki-Siren 2000	25	1.88 (0.78)	25	2.74 (1.28)		21.1 %	-0.86 [-1.45, -0.27]
Seracchioli 2002	60	1.8 (1.1)	62	2.3 (1.8)		26.2 %	-0.50 [-1.03, 0.03]
Subtotal (95% CI)	**85**		**87**			**47.3 %**	**-0.66 [-1.05, -0.27]**
Heterogeneity: Chi² = 0.80, df = 1 (P = 0.37); I² =0.0%							
Test for overall effect: Z = 3.30 (P = 0.00097)							
3 TLH versus AH							
Subtotal (95% CI)	**0**		**0**			**0.0 %**	**0.0 [0.0, 0.0]**
Heterogeneity: not applicable							



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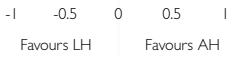
Study or subgroup	LH N	Mean(SD)	AH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Test for overall effect: not applicable							
4 Non-categorisable LH versus AH							
Subtotal (95% CI)	**0**		**0**			**0.0 %**	**0.0 [0.0, 0.0]**
Heterogeneity: not applicable							
Test for overall effect: not applicable							
Total (95% CI)	**143**		**145**			**100.0 %**	**-0.55 [-0.82, -0.28]**
Heterogeneity: Chi^2 = 1.33, df = 2 (P = 0.51); I^2 =0.0%							
Test for overall effect: Z = 4.03 (P = 0.000056)							
Test for subgroup differences: Chi^2 = 0.53, df = 1 (P = 0.47), I^2 =0.0%							



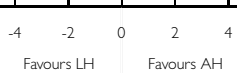
Analysis 3.21. Comparison 3 LH subcategory analyses versus AH, Outcome 21 Length of hospital stay (days).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 3 LH subcategory analyses versus AH

Outcome: 21 Length of hospital stay (days)

Study or subgroup	LH N	Mean(SD)	AH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 LAVH versus AH							
Kunz 1996	35	5 (0.85)	35	11 (2.86)		2.5 %	-6.00 [-6.99, -5.01]
Marana 1999	58	4 (1.2)	58	5.9 (2.3)		5.4 %	-1.90 [-2.57, -1.23]
Ottosen 2000	40	3.1 (1.4)	40	3.7 (1)		8.5 %	-0.60 [-1.13, -0.07]
Tsai 2003	100	3.2 (0.7)	100	5.5 (1.3)		29.0 %	-2.30 [-2.59, -2.01]
Subtotal (95% CI)	**233**		**233**			**45.4 %**	**-2.13 [-2.37, -1.90]**
Heterogeneity: Chi^2 = 92.30, df = 3 (P<0.00001); I^2 =97%							
Test for overall effect: Z = 18.11 (P < 0.00001)							
2 LH(a) versus AH							
Summitt 1998	34	2.12 (1.3)	31	4.13 (1.6)		4.8 %	-2.01 [-2.72, -1.30]
Harkki-Siren 2000	25	2.1 (0.3)	25	3.4 (0.7)		27.2 %	-1.30 [-1.60, -1.00]
Ollson 1996	71	2.5 (1.6)	72	5 (3.7)		2.8 %	-2.50 [-3.43, -1.57]
Seracchioli 2002	60	3.2 (1.3)	62	5.1 (1.7)		8.4 %	-1.90 [-2.44, -1.36]



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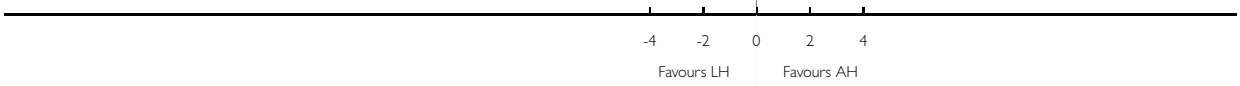
Study or subgroup	LH N	Mean(SD)	AH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Subtotal (95% CI)	**190**		**190**			**43.2 %**	**-1.57 [-1.81, -1.34]**
Heterogeneity: Chi^2 = 9.89, df = 3 (P = 0.02); I^2 =70%							
Test for overall effect: Z = 13.02 (P < 0.00001)							
3 TLH versus AH							
Kluivers 2007	27	4.2 (1.3)	32	5.4 (2.4)		2.6 %	-1.20 [-2.17, -0.23]
Perino 1999	51	2.4 (0.3)	51	6.2 (1.9)		8.7 %	-3.80 [-4.33, -3.27]
Subtotal (95% CI)	**78**		**83**			**11.3 %**	**-3.20 [-3.66, -2.74]**
Heterogeneity: Chi^2 = 21.45, df = 1 (P<0.00001); I^2 =95%							
Test for overall effect: Z = 13.55 (P < 0.00001)							
4 Non-categorisable LH versus AH							
Subtotal (95% CI)	**0**		**0**			**0.0 %**	**0.0 [0.0, 0.0]**
Heterogeneity: not applicable							
Test for overall effect: not applicable							
Total (95% CI)	**501**		**506**			**100.0 %**	**-2.01 [-2.17, -1.86]**
Heterogeneity: Chi^2 = 163.24, df = 9 (P<0.00001); I^2 =94%							
Test for overall effect: Z = 25.32 (P < 0.00001)							
Test for subgroup differences: Chi^2 = 39.61, df = 2 (P = 0.00), I^2 =95%							



Analysis 4.1. Comparison 4 LH versus AH subcategory analyses, Outcome 1 Wound/abdominal wall infection.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 4 LH versus AH subcategory analyses

Outcome: 1 Wound/abdominal wall infection

Study or subgroup	LAVH n/N	Minilaparotomy AH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
Muzii 2007	0/40	2/41		100.0 %	0.20 [0.01, 4.19]
Total (95% CI)	**40**	**41**		**100.0 %**	**0.20 [0.01, 4.19]**
Total events: 0 (LAVH), 2 (Minilaparotomy AH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.04 (P = 0.30)					

Analysis 4.2. Comparison 4 LH versus AH subcategory analyses, Outcome 2 Febrile episodes or unspecified infection.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 4 LH versus AH subcategory analyses

Outcome: 2 Febrile episodes or unspecified infection

Study or subgroup	LAVH n/N	Minilaparotomy AH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
Muzii 2007	0/40	3/41		100.0 %	0.14 [0.01, 2.72]
Total (95% CI)	**40**	**41**		**100.0 %**	**0.14 [0.01, 2.72]**
Total events: 0 (LAVH), 3 (Minilaparotomy AH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.31 (P = 0.19)					

Analysis 4.3. Comparison 4 LH versus AH subcategory analyses, Outcome 3 Unintended laparotomy.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 4 LH versus AH subcategory analyses

Outcome: 3 Unintended laparotomy

Study or subgroup	LAVH n/N	Minilaparotomy AH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
Muzii 2007	2/40	4/41		100.0 %	0.49 [0.08, 2.82]
Total (95% CI)	**40**	**41**		**100.0 %**	**0.49 [0.08, 2.82]**
Total events: 2 (LAVH), 4 (Minilaparotomy AH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.80 (P = 0.42)					

Analysis 4.4. Comparison 4 LH versus AH subcategory analyses, Outcome 4 Transfusion.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 4 LH versus AH subcategory analyses

Outcome: 4 Transfusion

Study or subgroup	LAVH n/N	Minilaparotomy AH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
Muzii 2007	0/40	1/41		100.0 %	0.33 [0.01, 8.43]
Total (95% CI)	**40**	**41**		**100.0 %**	**0.33 [0.01, 8.43]**

Total events: 0 (LAVH), 1 (Minilaparotomy AH)

Heterogeneity: not applicable

Test for overall effect: Z = 0.67 (P = 0.51)

Analysis 4.5. Comparison 4 LH versus AH subcategory analyses, Outcome 5 Wound dehiscence.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 4 LH versus AH subcategory analyses

Outcome: 5 Wound dehiscence

Study or subgroup	LAVH n/N	Minilaparotomy AH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
Muzii 2007	1/40	0/41		100.0 %	3.15 [0.12, 79.69]
Total (95% CI)	**40**	**41**		**100.0 %**	**3.15 [0.12, 79.69]**

Total events: 1 (LAVH), 0 (Minilaparotomy AH)

Heterogeneity: not applicable

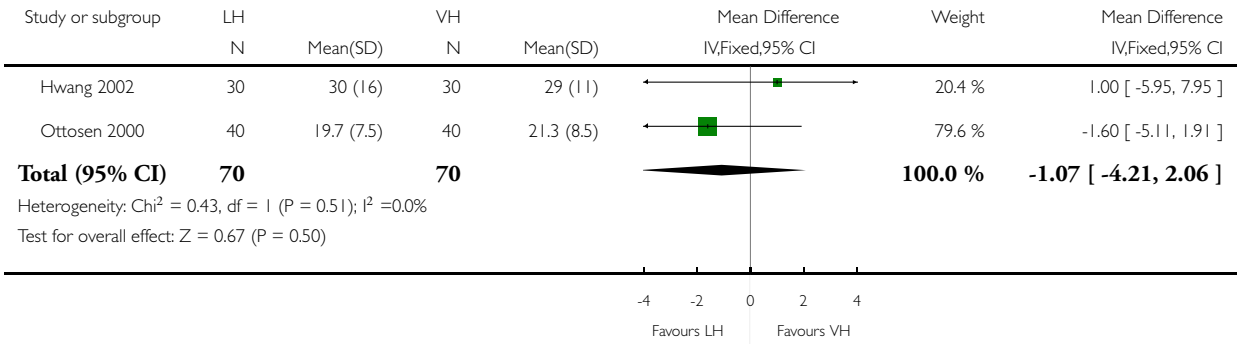
Test for overall effect: Z = 0.70 (P = 0.49)

Analysis 5.1. Comparison 5 LH versus VH, Outcome 1 Return to normal activities (days).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 5 LH versus VH

Outcome: 1 Return to normal activities (days)



Analysis 5.2. Comparison 5 LH versus VH, Outcome 2 Return to normal activities (descriptive data).

Return to normal activities (descriptive data)

Study	LH	VH	Comments
Richardson 1995	n=22 mean=23.1 days range (7-56)	n=23 mean=22.2 range (7-56)	

Analysis 5.3. Comparison 5 LH versus VH, Outcome 3 Long term outcomes: quality of life (descriptive data).

Long term outcomes: quality of life (descriptive data)

Study	Description	LH	VH	Comment
Morelli 2007	Physical Component Score (PSC-12) and Mental Component Score (MCS-12) of the questionnaire SF-12; Body Image Scale	PCS-12 Baseline: n=200; mean 44.9 (SD 11.7) At 6 weeks: n=197; mean 47.2 (SD 4.7) At 4 months: n= 185; mean 52.6 (SD 8.6) At 12 months: n=165; mean 53.6 (SD 8.4) MSC Baseline: n=200; mean 45.8 (SD 11.7) At 6 weeks: n=197; mean	PSC-12 Baseline: n=200; mean 45.6 (SD 11.5) At 6 weeks: n=195; mean 45.8 (SD 4.6) At 4 months: n=18; mean 53.0 (SD 7.8) At 12 months: n=160; mean 53.7 (SD 7.3) MSC-12 Baseline: n=200; mean 45.1 (SD 12.1) At 6 weeks: n=195; mean	p=0.003 at 6 weeks in PCS-12.

Long term outcomes: quality of life (descriptive data) (*Continued*)

		52.6 (SD 11.4) At 4 months: n=185; mean 53.0 (SD 10.5) At 12 months: n=165; mean 52.7 (SD 10.7) BIS Baseline: n=200; mean 8.8 (SD 8.1) At 6 weeks: n=197; mean 3.7 (SD 4.9) At 4 months: n=185; mean 3.3 (SD 4.9) At 12 months: n=165; mean 3.4 (SD 5.2)	53.2 (SD 9.1) At 4 months: n=181; mean 53.1 (SD 8.1) At 12 months: n=160; mean 52.9 (SD 11.4) BIS Baseline: n=200; mean 8.4 (SD 7.4) At 6 weeks: n=195; mean 3.0 (SD 3.5) At 4 months: n=181; mean 3.1 (SD 4.9) At 12 months: n=160; mean 3.0 (SD 4.8)	

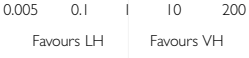
Analysis 5.4. Comparison 5 LH versus VH, Outcome 4 Intraoperative visceral injury (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 5 LH versus VH

Outcome: 4 Intraoperative visceral injury (dich)

Study or subgroup	LH n/N	VH n/N	Odds Ratio M-H,Fixed,95% CI	Odds Ratio M-H,Fixed,95% CI
1 Bladder injury				
Darai 2001	1/40	0/40		3.08 [0.12, 77.80]
Garry 2004	3/336	2/168		0.75 [0.12, 4.52]
Morelli 2007	7/200	2/200		3.59 [0.74, 17.50]
Ottosen 2000	0/40	1/40		0.33 [0.01, 8.22]
Ribiero 2003	0/20	1/20		0.32 [0.01, 8.26]
Richardson 1995	1/22	1/23		1.05 [0.06, 17.85]
Summitt 1992	1/29	0/27		2.89 [0.11, 74.15]
Subtotal (95% CI)	**687**	**518**		**1.46 [0.63, 3.35]**
Total events: 13 (LH), 7 (VH)				
Heterogeneity: Chi² = 3.87, df = 6 (P = 0.69); I² =0.0%				
Test for overall effect: Z = 0.88 (P = 0.38)				
2 Ureter injury				



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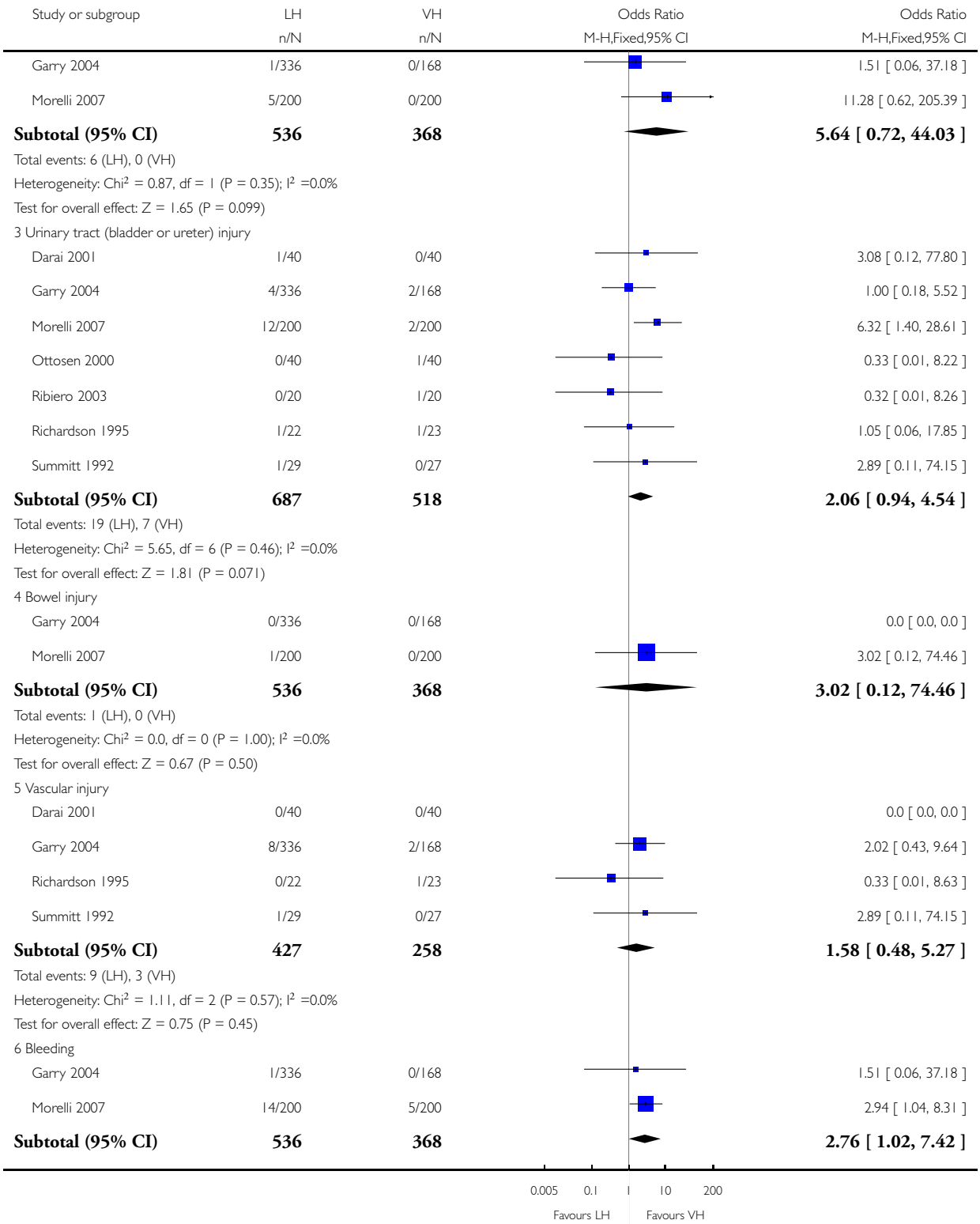

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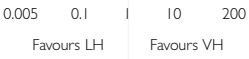
Study or subgroup	LH n/N	VH n/N	Odds Ratio M-H,Fixed,95% CI	Odds Ratio M-H,Fixed,95% CI
Total events: 15 (LH), 5 (VH)				
Heterogeneity: Chi² = 0.15, df = 1 (P = 0.70); I² =0.0%				
Test for overall effect: Z = 2.01 (P = 0.045)				
7 Unintended laparotomy				
Agostini 2006	0/24	0/24		0.0 [0.0, 0.0]
Darai 2001	3/40	0/40		7.56 [0.38, 151.28]
Garry 2004	9/336	7/168		0.63 [0.23, 1.73]
Morelli 2007	10/200	8/200		1.26 [0.49, 3.27]
Ottosen 2000	4/40	1/40		4.33 [0.46, 40.61]
Richardson 1995	1/22	1/23		1.05 [0.06, 17.85]
Soriano 2001	3/37	0/40		8.22 [0.41, 164.68]
Summitt 1992	1/29	0/27		2.89 [0.11, 74.15]
Subtotal (95% CI)	**728**	**562**		**1.44 [0.81, 2.56]**
Total events: 31 (LH), 17 (VH)				
Heterogeneity: Chi² = 6.27, df = 6 (P = 0.39); I² =4%				
Test for overall effect: Z = 1.25 (P = 0.21)				

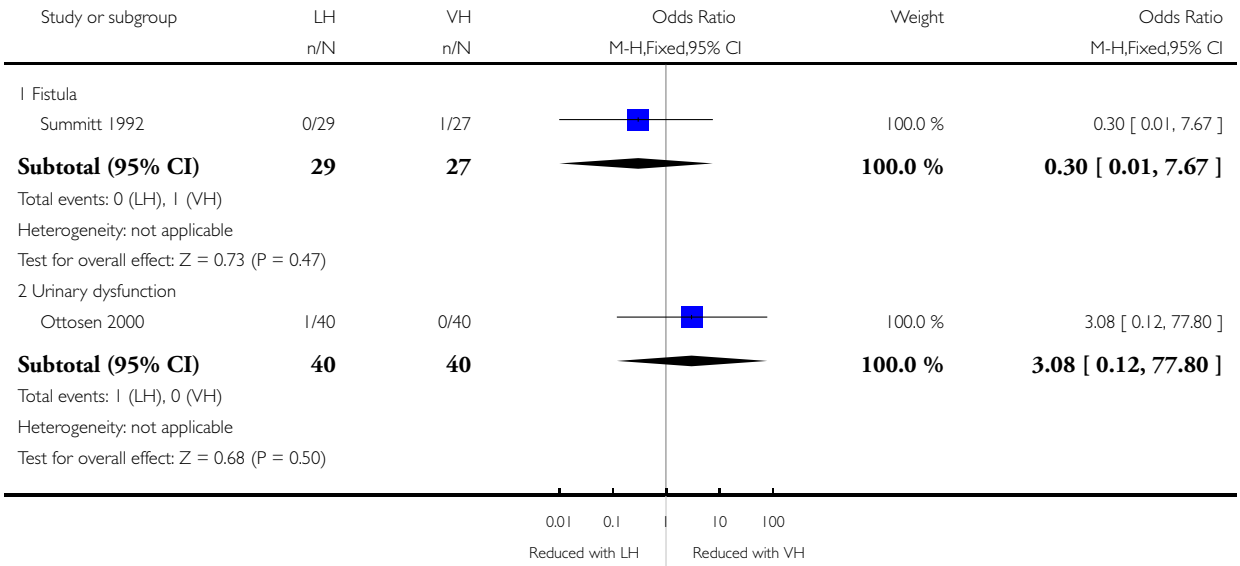


Analysis 5.5. Comparison 5 LH versus VH, Outcome 5 Long term complications (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 5 LH versus VH

Outcome: 5 Long term complications (dich)



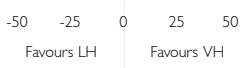
Analysis 5.6. Comparison 5 LH versus VH, Outcome 6 Operation time (mins).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 5 LH versus VH

Outcome: 6 Operation time (mins)

Study or subgroup	LH N	Mean(SD)	VH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 LAVH versus VH							
Agostini 2006	24	100.2 (27.9)	24	83.9 (34.6)		0.1 %	16.30 [-1.48, 34.08]
Ottosen 2000	40	102 (31)	40	81 (28)		0.2 %	21.00 [8.05, 33.95]
Subtotal (95% CI)	**64**		**64**			**0.3 %**	**19.37 [8.91, 29.84]**
Heterogeneity: Chi^2 = 0.18, df = 1 (P = 0.68); I^2 =0.0%							
Test for overall effect: Z = 3.63 (P = 0.00029)							
2 LH(a) versus VH							
Darai 2001	40	160 (50)	40	108 (35)		0.1 %	52.00 [33.09, 70.91]
Soriano 2001	37	160 (50)	40	108 (35)		0.1 %	52.00 [32.58, 71.42]
Summitt 1992	29	120.1 (28.5)	27	64.7 (27)		0.2 %	55.40 [40.86, 69.94]
Subtotal (95% CI)	**106**		**107**			**0.3 %**	**53.58 [43.67, 63.49]**
Heterogeneity: Chi^2 = 0.11, df = 2 (P = 0.95); I^2 =0.0%							
Test for overall effect: Z = 10.60 (P < 0.00001)							
3 TLH versus VH							
Morelli 2007	200	85.9 (3)	200	46.6 (2.8)		99.4 %	39.30 [38.73, 39.87]
Subtotal (95% CI)	**200**		**200**			**99.4 %**	**39.30 [38.73, 39.87]**
Heterogeneity: not applicable							
Test for overall effect: Z = 135.44 (P < 0.00001)							
4 Non-categorisable LH versus VH							
Subtotal (95% CI)	**0**		**0**			**0.0 %**	**0.0 [0.0, 0.0]**
Heterogeneity: not applicable							
Test for overall effect: not applicable							
Total (95% CI)	**370**		**371**			**100.0 %**	**39.29 [38.72, 39.86]**
Heterogeneity: Chi^2 = 22.19, df = 5 (P = 0.00048); I^2 =77%							
Test for overall effect: Z = 135.82 (P < 0.00001)							
Test for subgroup differences: Chi^2 = 21.90, df = 2 (P = 0.00), I^2 =91%							



Analysis 5.7. Comparison 5 LH versus VH, Outcome 7 Operation time (descriptive data).

Operation time (descriptive data)

Study	LH	VH	Comments
Hwang 2002	With 2nd proc: n=13 Median=119 Range (80-165)	With 2nd proc: n=3 Median=93 Range (80-110)	Kruskal Wallis test: p=0.12 p<0.001

Operation time (descriptive data) (*Continued*)

	Without 2nd proc: n=17 Median=109 Range (85-175)	Without 2nd proc: n=27 Median=74 Range (40-120)	
Ribiero 2003	n=20 mean 119 mins (no measure of spread)	n=20 mean 78 mins (no measure of spread)	
Richardson 1995	n=22 mean=131.4 mins range (76-180)	n=23 mean=76.7 mins range (35-150)	Some of these cases include oophorectomies. Oophorectomy (mean): LH 129.7 mins, VH 95.3 mins; no oophorectomy (mean): LH 132.7 mins, VH 64.7 mins.

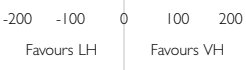
Analysis 5.8. Comparison 5 LH versus VH, Outcome 8 Other intraoperative complications (cont).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 5 LH versus VH

Outcome: 8 Other intraoperative complications (cont)

Study or subgroup	LH N	Mean(SD)	VH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Estimated blood loss (mls)							
Hwang 2002	30	343 (218)	30	215 (134)		42.8 %	128.00 [36.43, 219.57]
Ottosen 2000	40	311 (305)	40	287 (211)		27.2 %	24.00 [-90.93, 138.93]
Summitt 1992	29	203.8 (130.5)	27	376.1 (261.5)		30.0 %	-172.30 [-281.78, -62.82]
Subtotal (95% CI)	**99**		**97**			**100.0 %**	**9.72 [-50.21, 69.65]**
Heterogeneity: Chi^2 = 17.09, df = 2 (P = 0.00019); I^2 =88%							
Test for overall effect: Z = 0.32 (P = 0.75)							
2 Change in Hb							
Darai 2001	40	2.1 (1.4)	40	2 (1.2)		51.1 %	0.10 [-0.47, 0.67]
Soriano 2001	37	2.2 (1.4)	40	2 (1.2)		48.9 %	0.20 [-0.38, 0.78]
Subtotal (95% CI)	**77**		**80**			**100.0 %**	**0.15 [-0.26, 0.56]**
Heterogeneity: Chi^2 = 0.06, df = 1 (P = 0.81); I^2 =0.0%							
Test for overall effect: Z = 0.71 (P = 0.48)							
Test for subgroup differences: Chi^2 = 0.10, df = 1 (P = 0.75), I^2 =0.0%							



Analysis 5.9. Comparison 5 LH versus VH, Outcome 9 Other intraoperative complications (descriptive data).

Other intraoperative complications (descriptive data)

Study	LH	VH	Comments
Estimated blood loss (ml)			
Agostini 2006	8 out of 24 women >500 mL blood loss	5 out of 24 women >500 mL blood loss	p=0.039
Richardson 1995	n=22 mean=272 mL	n=23 mean=181 mL	
Change in Hb			
Richardson 1995	n=22 mean=1.24 g/dL	n=23 mean=1.05 g/dL	

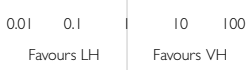
Analysis 5.10. Comparison 5 LH versus VH, Outcome 10 Short term outcomes (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 5 LH versus VH

Outcome: 10 Short term outcomes (dich)

Study or subgroup	LH n/N	VH n/N	Odds Ratio M-H,Fixed,95% CI	Odds Ratio M-H,Fixed,95% CI
1 Transfusion				
Agostini 2006	0/24	0/24		0.0 [0.0, 0.0]
Darai 2001	1/40	1/40		1.00 [0.06, 16.56]
Garry 2004	17/336	5/168		1.74 [0.63, 4.79]
Hwang 2002	5/30	1/30		5.80 [0.63, 53.01]
Morelli 2007	14/200	5/200		2.94 [1.04, 8.31]
Ottosen 2000	1/40	2/40		0.49 [0.04, 5.60]
Soriano 2001	1/37	1/40		1.08 [0.07, 17.97]
Subtotal (95% CI)	**707**	**542**		**2.07 [1.12, 3.81]**
Total events: 39 (LH), 15 (VH)				
Heterogeneity: Chi^2 = 3.19, df = 5 (P = 0.67); I^2 =0.0%				



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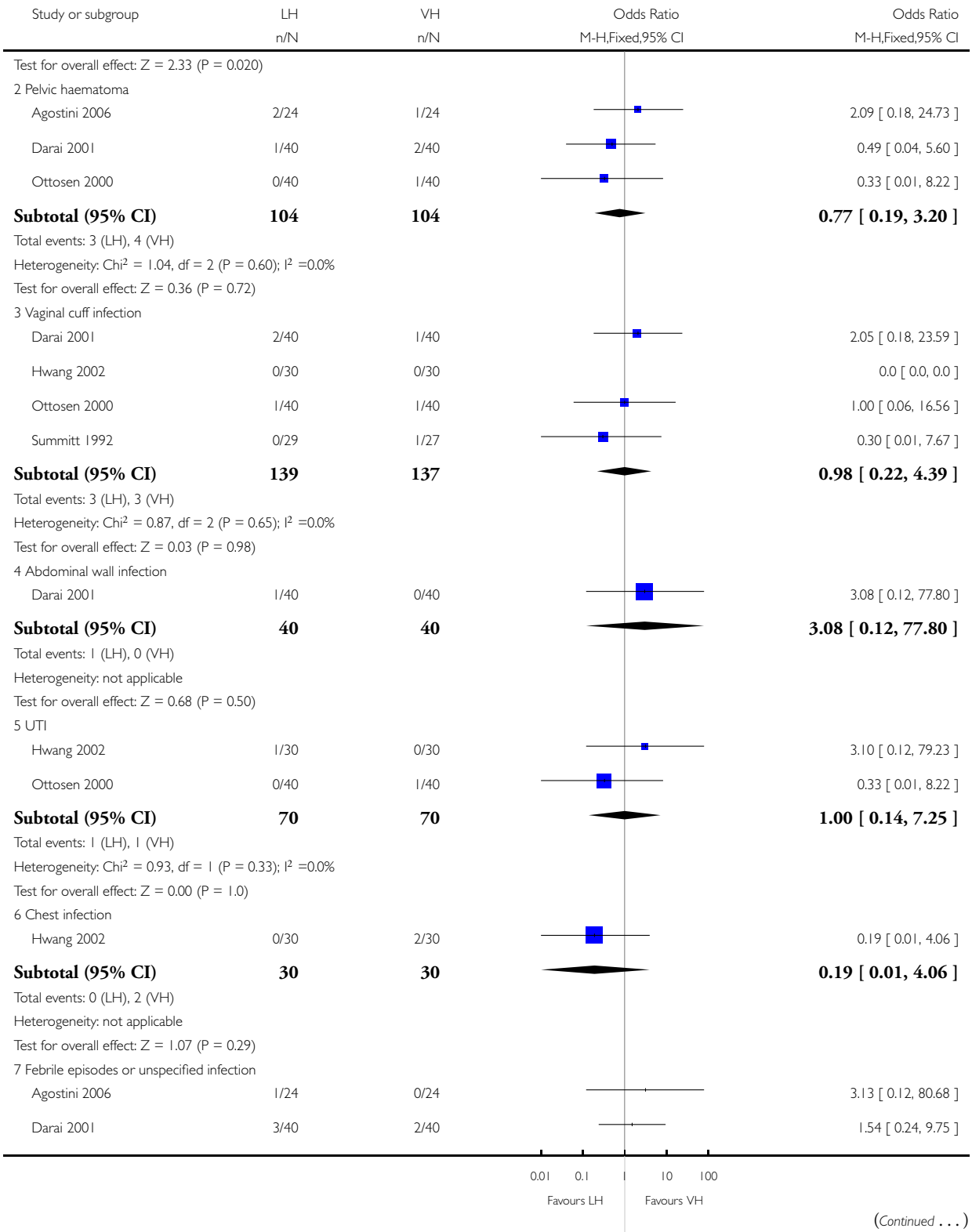

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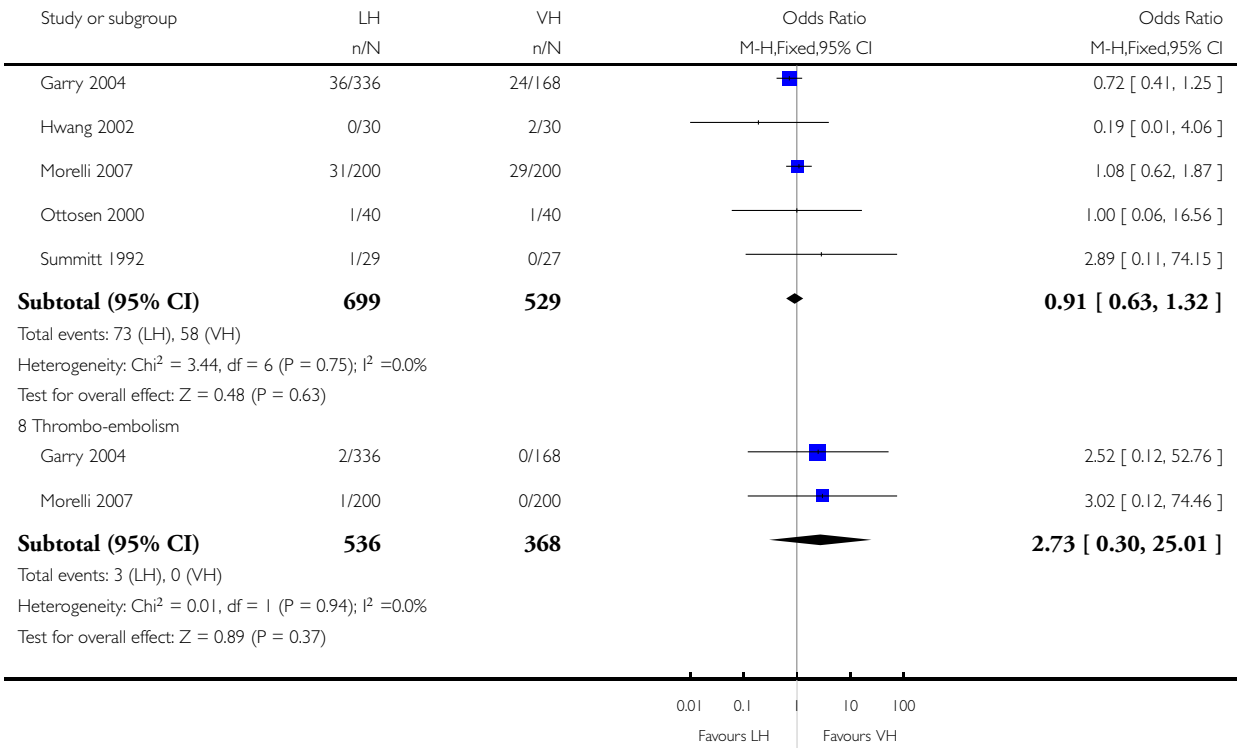


Analysis 5.11. Comparison 5 LH versus VH, Outcome 11 Pain relief (descriptive data).

Pain relief (descriptive data)

Study	Description	LH	VH	Conclusion
Pain scales				
Morelli 2007	VAS pain on day of surgery, day 2 and at discharge from hospital to home.	Day of surgery: mean 5.3 (SD 1.2). Day 2: mean 3.0 (SD 0.6). Discharge: mean 2.0 (SD 0.5).	Day of surgery: mean 6.0 (SD 1.2). Day 2: mean 2.7 (SD 0.9). Discharge: mean 1.8 (SD 0.7).	p = 0.000 for pain on day 0
Postoperative analgesics				
Richardson 1995	The number of postoperative opoid injections and the number of days analgesia was required was recorded.	n=22 Opoid injections: mean= 2.3, range (0-8). Analgesia required: mean= 2.9 days, range (0-20).	n=23 Opoid injections: mean= 2.6, range (0-15). Analgesia required: Mean=2.6 days, range (1-17).	The number of opoid injections and analgesia requirements were similar in each group.

Pain relief (descriptive data) (*Continued*)

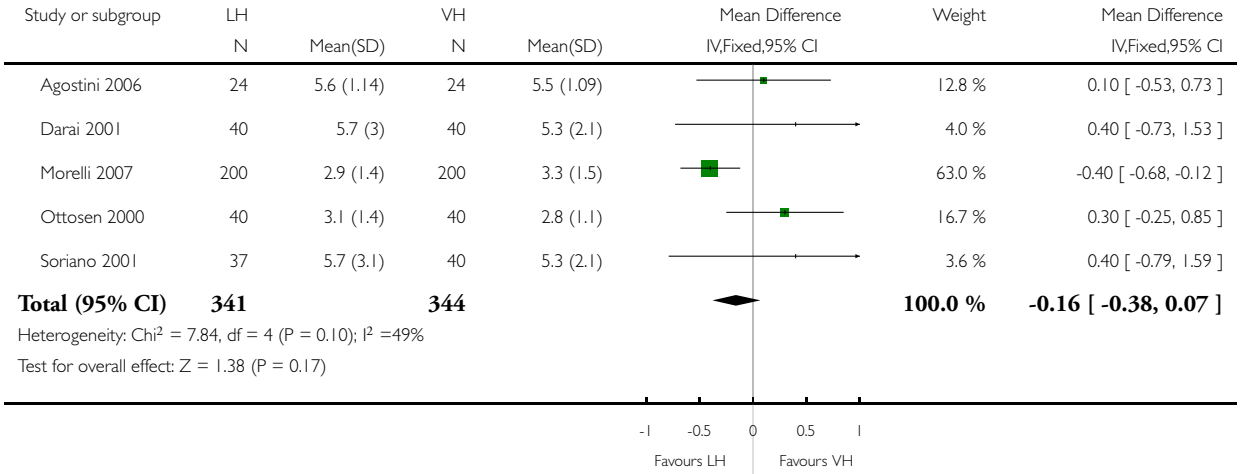
Soriano 2001	Total consumption of paracetamol, NSAID and subcutaneous opoid.	n=37 Paracetamol: mean= 11.1g, sd=5.6. NSAID:mean=137mg, sd=148. Opoid: mean 6.8mg, sd= 13.7.	n=40 Paracetamol: mean= 10.1g, sd=6.7. NSAID: mean=137mg, sd=155. Opoid: mean=8.7mg, sd= 15.7.	No significant difference in the total consumption of paracetamol, NSAID and subcutaneous opoid between the two groups.
Summitt 1992	Pain control was assessed by documenting the intramuscular narcotic use on the day of surgery and the number of pain tablets used on the day of surgery and the first 2 postoperative days.	n=28 Number of oral pain tablets. Day of surgery: mean= 3.13, sd=2.1, range(0-9). P=NS Post op Day 1: mean= 3.67, sd=2.5, range (1-10) . P=NS. Post op Day 2: mean= 2.71, sd=2.9, range (0-12) . P=0.27. Number of participants requiring IM narcotics within the first 6 hours after surgery: 9.	n=27 Number of oral pain tablets. Day of surgery: mean= 3.82, sd=1.8, range (0-7). P=NS. Post op Day 1: mean= 3.61, sd=2.3, range (0-10) . P=NS Post op Day 2: mean= 1.57, sd=1.5, range (0-5). P=0.27. Number of participants requiring IM narcotics within the first 6 hours after surgery: 8.	The only statistical difference was on postoperative day 2, the LH group required an average 2.7 tablets, compared with 1.6 tablets for the VH. No significant difference in the number of particiapnts requiring IM narcotics within the first 6 hours after surgery.

Analysis 5.12. Comparison 5 LH versus VH, Outcome 12 Length of hospital stay (days).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 5 LH versus VH

Outcome: 12 Length of hospital stay (days)



Analysis 5.13. Comparison 5 LH versus VH, Outcome 13 Length of hospital stay (descriptive data).

Length of hospital stay (descriptive data)

Study	LH	VH	Comments
Hwang 2002	n=30 median=4.7 days range (3-7)	n=30 median=4.7 days range (3-7)	Not tested separately
Richardson 1995	n=22 mean=3.2 days range (2-7)	n=23 mean=3.3 days range (1-18)	

Analysis 5.14. Comparison 5 LH versus VH, Outcome 14 Cost (descriptive data).

Cost (descriptive data)

Study	Description	LH	VH
Summitt 1992	Mean total hospital charge when surgery was performed on an outpatient basis. Charges consisted of: operating room fee, operating room time, anaesthesia time, charges for disposable staples, scissors, graspers and a charge for recovery in the am-	n=29 Mean=$7905, sd=501, range (7197-8289). P=0.035	n=27 Mean=$4891, ds=355, range (4311-5247). P=0.035

	bulatory surgery unit, including laboratory fees.		

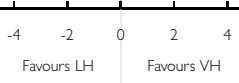
Analysis 6.1. Comparison 6 LH subcategory analyses versus VH, Outcome 1 Return to normal activities (days).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 1 Return to normal activities (days)

Study or subgroup	LH N	Mean(SD)	VH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 LAVH versus VH							
Ottosen 2000	40	19.7 (7.5)	40	21.3 (8.5)		79.6 %	-1.60 [-5.11, 1.91]
Subtotal (95% CI)	**40**		**40**			**79.6 %**	**-1.60 [-5.11, 1.91]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.89 (P = 0.37)							
2 LH(a) versus VH							
Hwang 2002	30	30 (16)	30	29 (11)		20.4 %	1.00 [-5.95, 7.95]
Subtotal (95% CI)	**30**		**30**			**20.4 %**	**1.00 [-5.95, 7.95]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.28 (P = 0.78)							
3 TLH versus VH							
Subtotal (95% CI)	**0**		**0**			**0.0 %**	**0.0 [0.0, 0.0]**
Heterogeneity: not applicable							
Test for overall effect: not applicable							
4 Non-categorisable LH versus VH							
Subtotal (95% CI)	**0**		**0**			**0.0 %**	**0.0 [0.0, 0.0]**
Heterogeneity: not applicable							
Test for overall effect: not applicable							
Total (95% CI)	**70**		**70**			**100.0 %**	**-1.07 [-4.21, 2.06]**
Heterogeneity: Chi^2 = 0.43, df = 1 (P = 0.51); I^2 =0.0%							
Test for overall effect: Z = 0.67 (P = 0.50)							
Test for subgroup differences: Chi^2 = 0.43, df = 1 (P = 0.51), I^2 =0.0%							

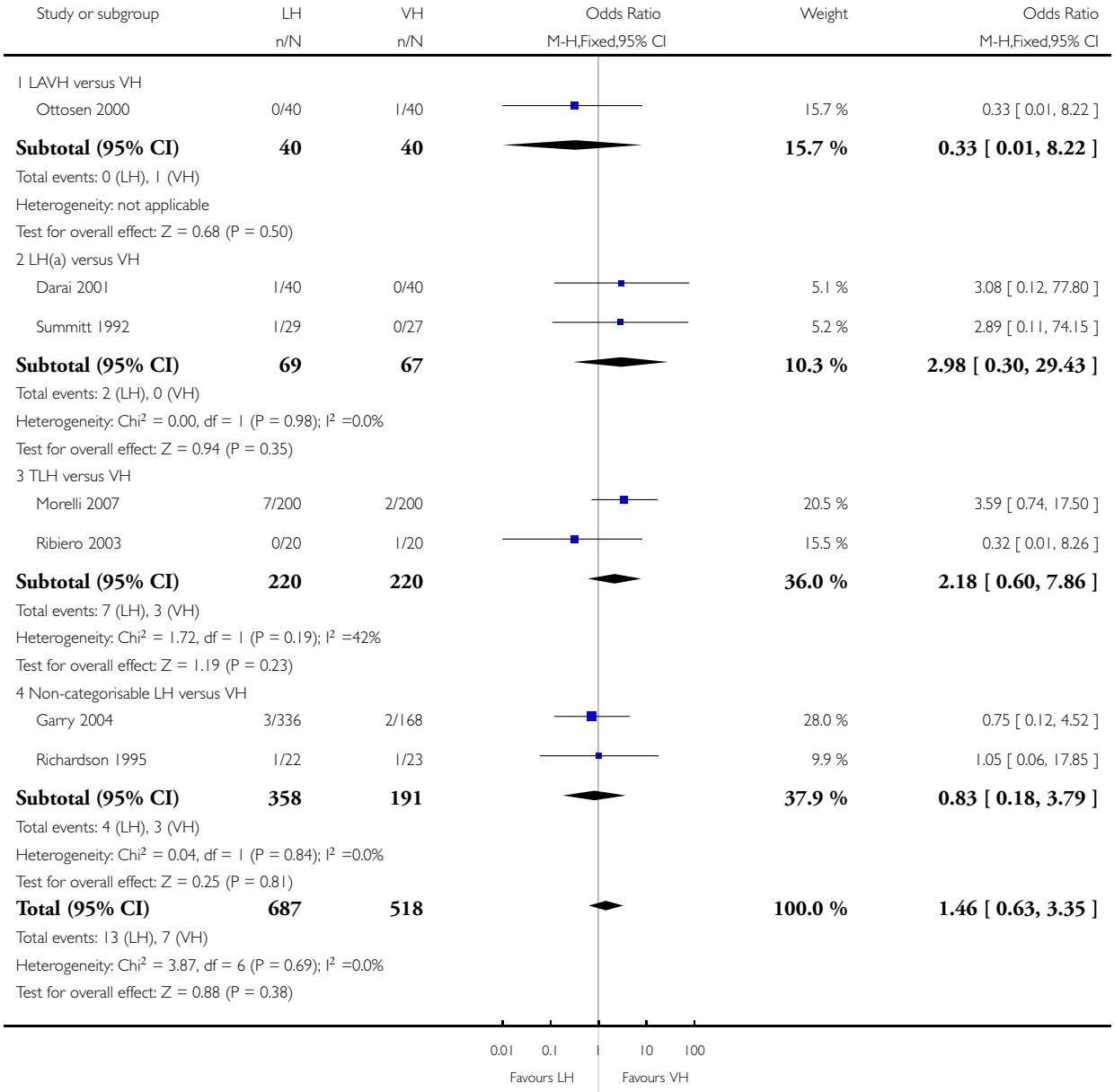


Analysis 6.2. Comparison 6 LH subcategory analyses versus VH, Outcome 2 Bladder injury.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 2 Bladder injury

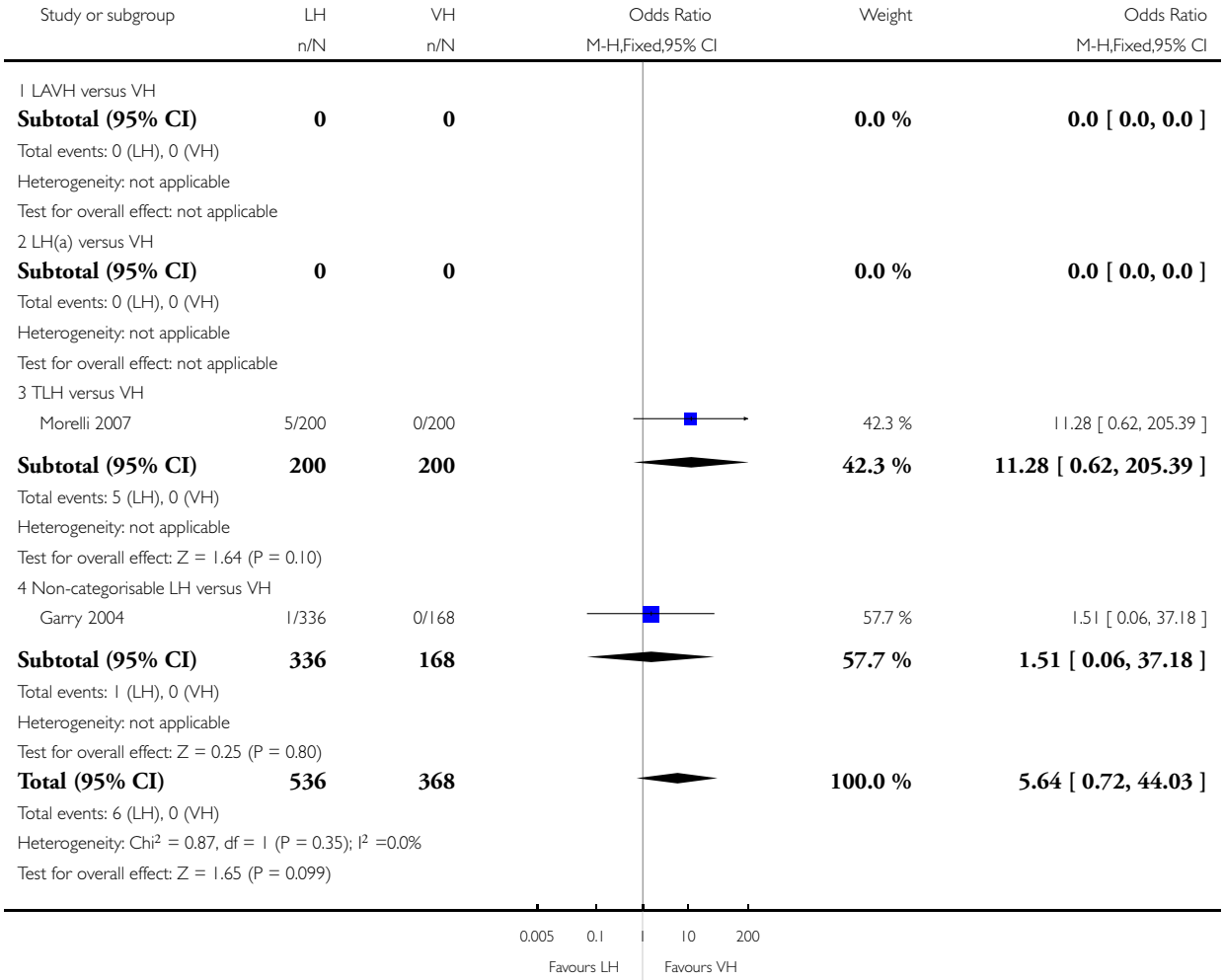


Analysis 6.3. Comparison 6 LH subcategory analyses versus VH, Outcome 3 Ureter injury.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 3 Ureter injury

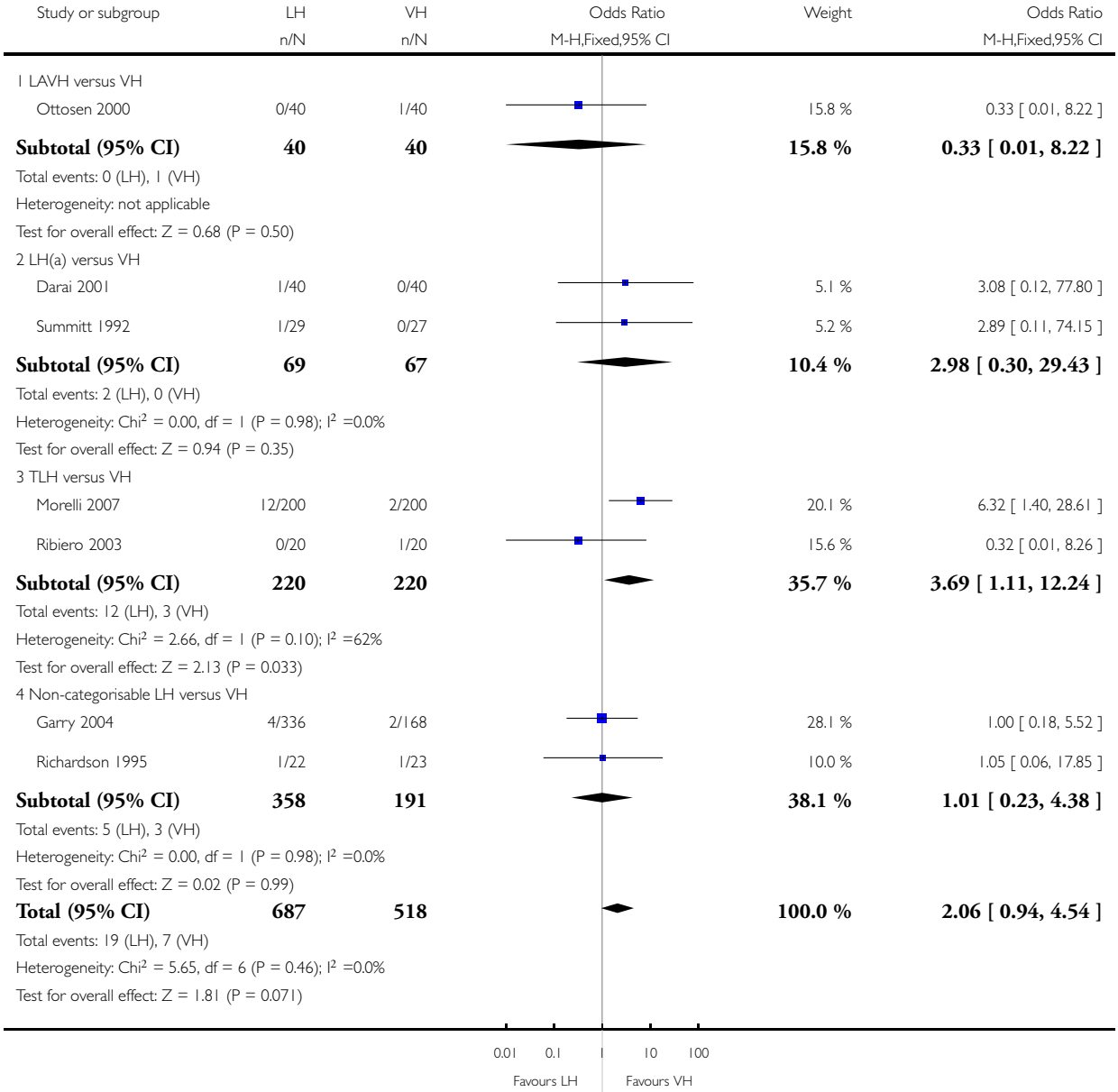


Analysis 6.4. Comparison 6 LH subcategory analyses versus VH, Outcome 4 Urinary tract (bladder or ureter) injury.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 4 Urinary tract (bladder or ureter) injury



Analysis 6.5. Comparison 6 LH subcategory analyses versus VH, Outcome 5 Bowel injury.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 5 Bowel injury

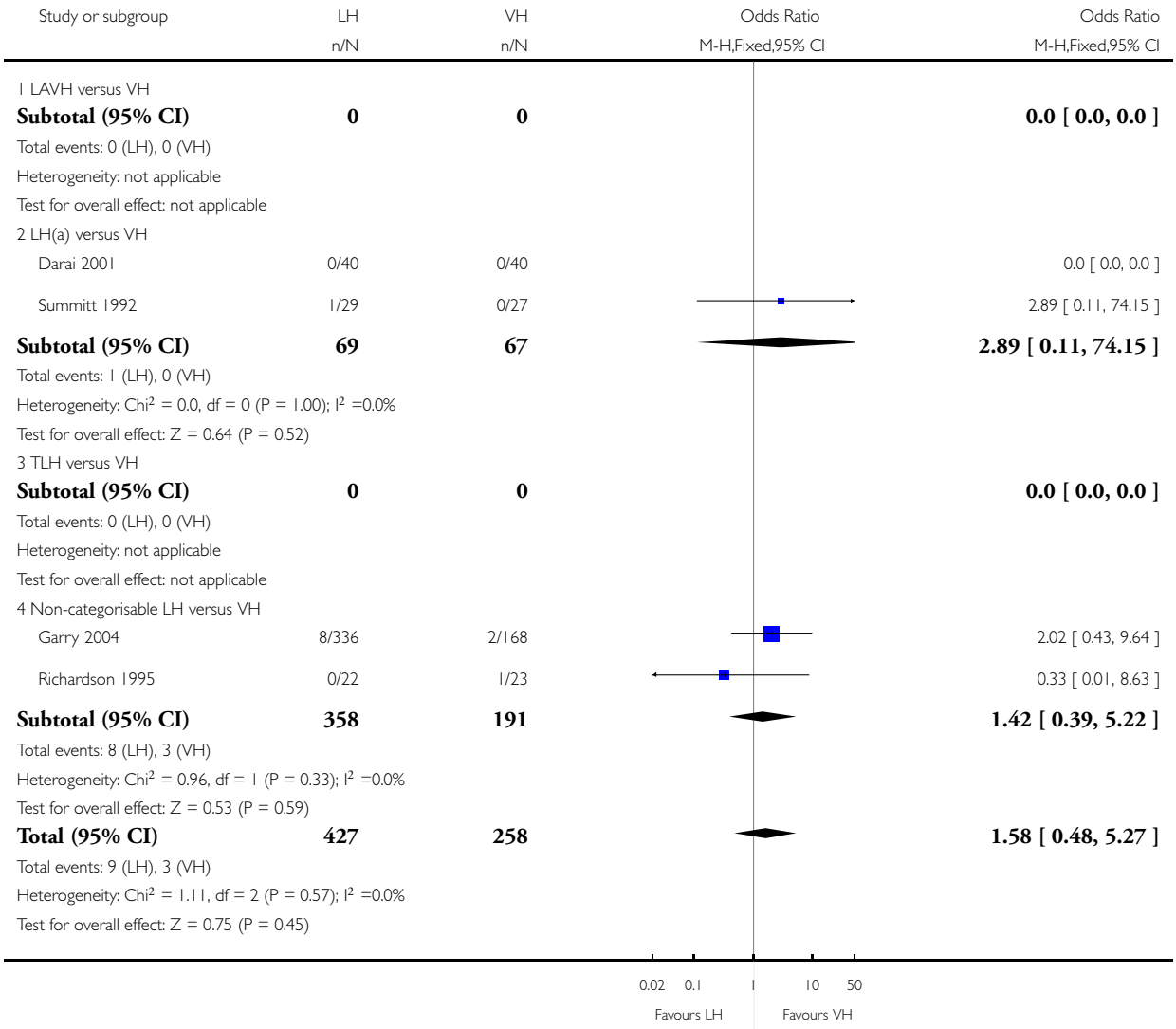
Study or subgroup	LH n/N	VH n/N	Odds Ratio M-H,Fixed,95% CI	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus VH				
Subtotal (95% CI)	**0**	**0**		**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)				
Heterogeneity: not applicable				
Test for overall effect: not applicable				
2 LH(a) versus VH				
Subtotal (95% CI)	**0**	**0**		**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)				
Heterogeneity: not applicable				
Test for overall effect: not applicable				
3 TLH versus VH				
Morelli 2007	1/200	0/200		3.02 [0.12, 74.46]
Subtotal (95% CI)	**200**	**200**		**3.02 [0.12, 74.46]**
Total events: 1 (LH), 0 (VH)				
Heterogeneity: not applicable				
Test for overall effect: Z = 0.67 (P = 0.50)				
4 Non-categorisable LH versus VH				
Garry 2004	0/336	0/168		0.0 [0.0, 0.0]
Subtotal (95% CI)	**336**	**168**		**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)				
Heterogeneity: not applicable				
Test for overall effect: Z = 0.0 (P < 0.00001)				
Total (95% CI)	**536**	**368**		**3.02 [0.12, 74.46]**
Total events: 1 (LH), 0 (VH)				
Heterogeneity: Chi^2 = 0.0, df = 0 (P = 1.00); I^2 =0.0%				
Test for overall effect: Z = 0.67 (P = 0.50)				

Analysis 6.6. Comparison 6 LH subcategory analyses versus VH, Outcome 6 Vascular injury.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 6 Vascular injury



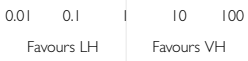
Analysis 6.7. Comparison 6 LH subcategory analyses versus VH, Outcome 7 Fistula.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 7 Fistula

Study or subgroup	LH n/N	VH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
2 LH(a) versus VH					
Summitt 1992	0/29	1/27		100.0 %	0.30 [0.01, 7.67]
Subtotal (95% CI)	**29**	**27**		**100.0 %**	**0.30 [0.01, 7.67]**
Total events: 0 (LH), 1 (VH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.73 (P = 0.47)					
3 TLH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
4 Non-categorisable LH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
Total (95% CI)	**29**	**27**		**100.0 %**	**0.30 [0.01, 7.67]**
Total events: 0 (LH), 1 (VH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.73 (P = 0.47)					



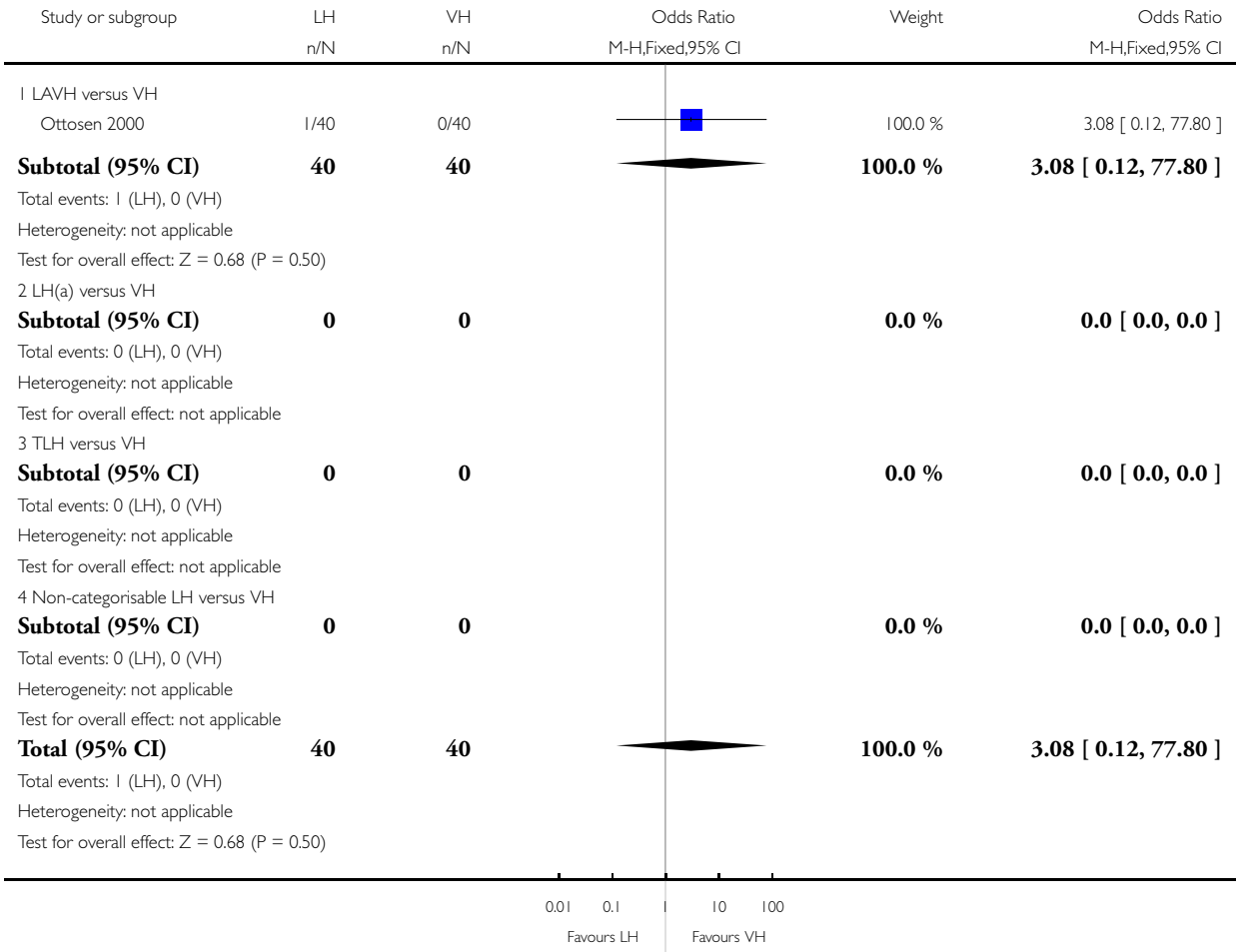
Analysis 6.8. Comparison 6 LH subcategory analyses versus VH, Outcome 8 Urinary dysfunction.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 8 Urinary dysfunction

Study or subgroup	LH n/N	VH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus VH					
Ottosen 2000	1/40	0/40		100.0 %	3.08 [0.12, 77.80]
Subtotal (95% CI)	**40**	**40**		**100.0 %**	**3.08 [0.12, 77.80]**
Total events: 1 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.68 (P = 0.50)					
2 LH(a) versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
3 TLH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
4 Non-categorisable LH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
Total (95% CI)	**40**	**40**		**100.0 %**	**3.08 [0.12, 77.80]**
Total events: 1 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.68 (P = 0.50)					

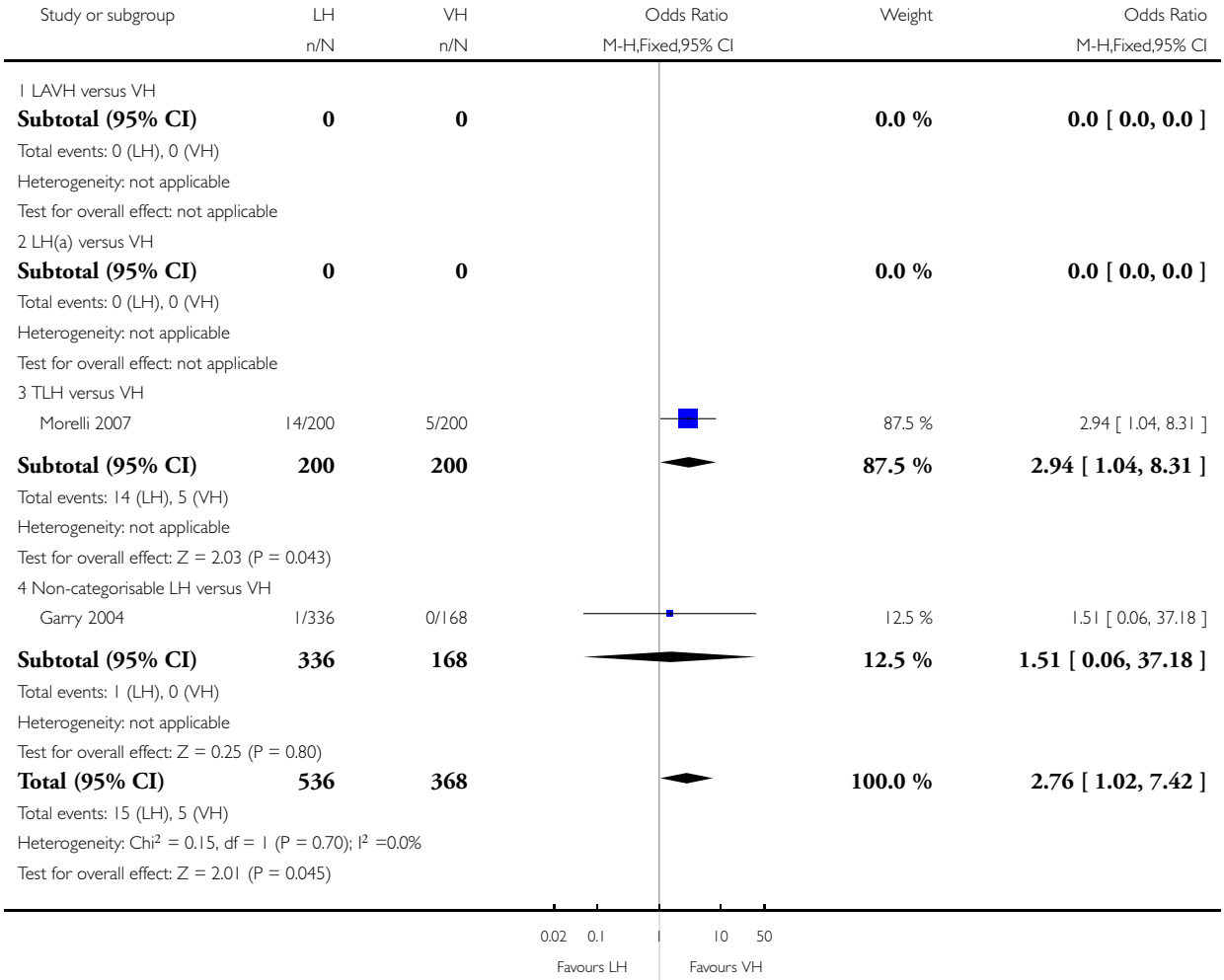


Analysis 6.9. Comparison 6 LH subcategory analyses versus VH, Outcome 9 Bleeding.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 9 Bleeding

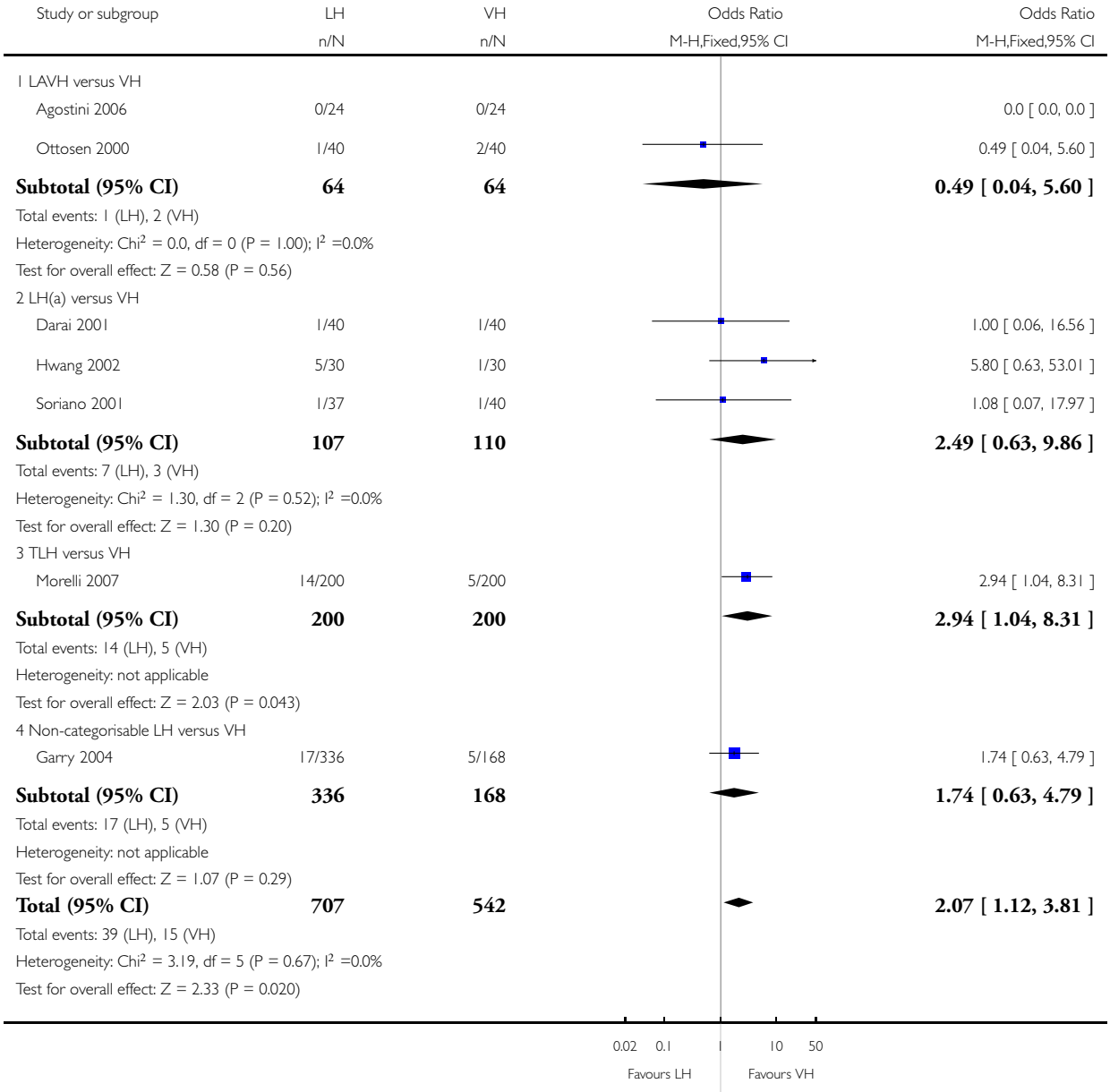


Analysis 6.10. Comparison 6 LH subcategory analyses versus VH, Outcome 10 Transfusion.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 10 Transfusion



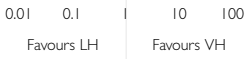
Analysis 6.11. Comparison 6 LH subcategory analyses versus VH, Outcome 11 Pelvic haematoma.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 11 Pelvic haematoma

Study or subgroup	LH n/N	VH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus VH					
Agostini 2006	2/24	1/24		21.1 %	2.09 [0.18, 24.73]
Ottosen 2000	0/40	1/40		34.1 %	0.33 [0.01, 8.22]
Subtotal (95% CI)	**64**	**64**		**55.2 %**	**1.00 [0.17, 5.99]**
Total events: 2 (LH), 2 (VH)					
Heterogeneity: Chi^2 = 0.81, df = 1 (P = 0.37); I^2 =0.0%					
Test for overall effect: Z = 0.0 (P = 1.0)					
2 LH(a) versus VH					
Darai 2001	1/40	2/40		44.8 %	0.49 [0.04, 5.60]
Subtotal (95% CI)	**40**	**40**		**44.8 %**	**0.49 [0.04, 5.60]**
Total events: 1 (LH), 2 (VH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.58 (P = 0.56)					
3 TLH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
4 Non-categorisable LH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
Total (95% CI)	**104**	**104**		**100.0 %**	**0.77 [0.19, 3.20]**
Total events: 3 (LH), 4 (VH)					
Heterogeneity: Chi^2 = 1.04, df = 2 (P = 0.60); I^2 =0.0%					
Test for overall effect: Z = 0.36 (P = 0.72)					

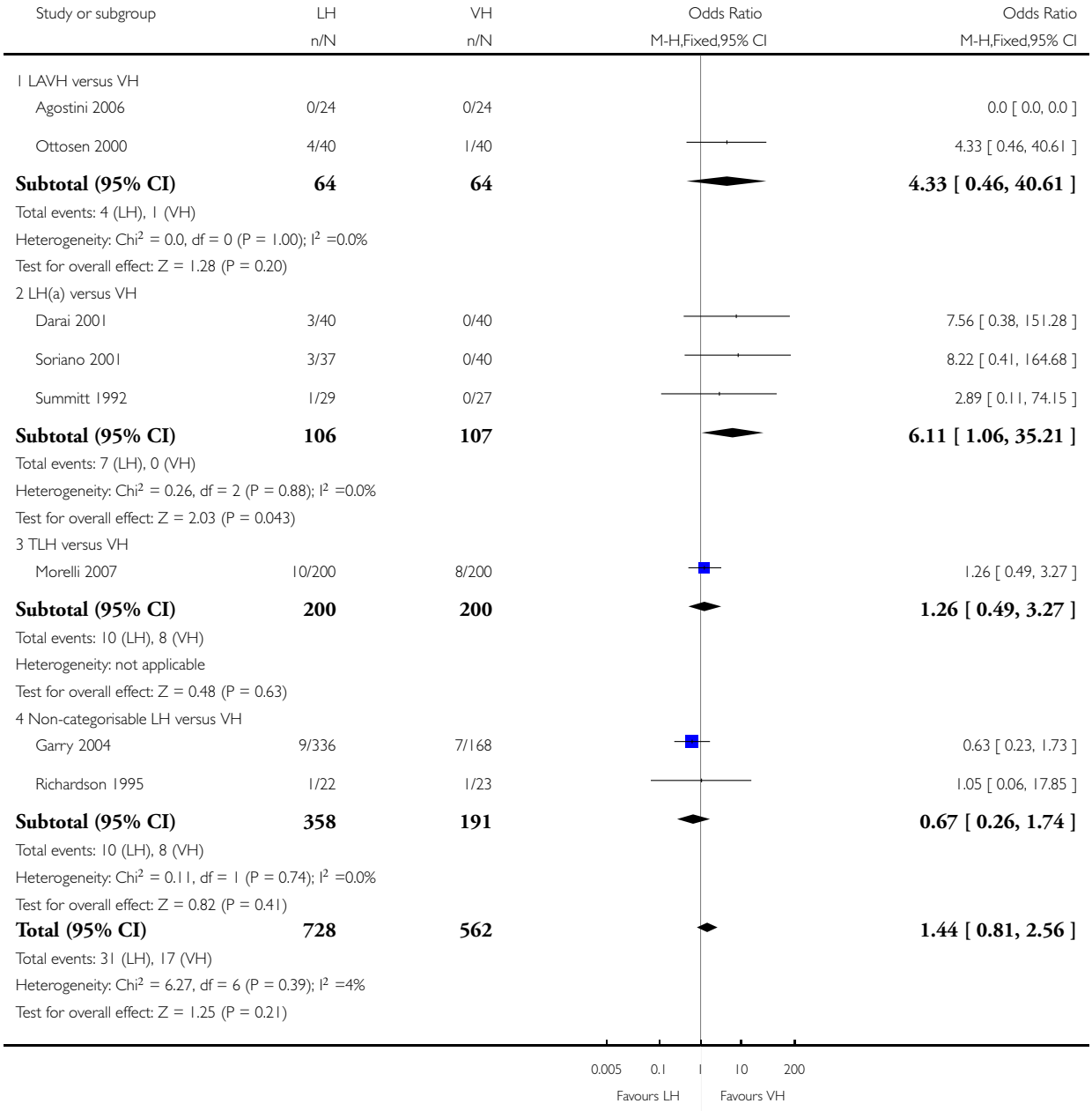


Analysis 6.12. Comparison 6 LH subcategory analyses versus VH, Outcome 12 Unintended laparotomy.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 12 Unintended laparotomy



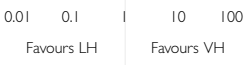
Analysis 6.13. Comparison 6 LH subcategory analyses versus VH, Outcome 13 Vaginal cuff infection.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 13 Vaginal cuff infection

Study or subgroup	LH n/N	VH n/N	Odds Ratio M-H,Fixed,95% CI	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus VH				
Ottosen 2000	1/40	1/40		1.00 [0.06, 16.56]
Subtotal (95% CI)	**40**	**40**		**1.00 [0.06, 16.56]**
Total events: 1 (LH), 1 (VH)				
Heterogeneity: not applicable				
Test for overall effect: Z = 0.0 (P = 1.0)				
2 LH(a) versus VH				
Darai 2001	2/40	1/40		2.05 [0.18, 23.59]
Hwang 2002	0/30	0/30		0.0 [0.0, 0.0]
Summitt 1992	0/29	1/27		0.30 [0.01, 7.67]
Subtotal (95% CI)	**99**	**97**		**0.97 [0.16, 5.73]**
Total events: 2 (LH), 2 (VH)				
Heterogeneity: Chi^2 = 0.87, df = 1 (P = 0.35); I^2 =0.0%				
Test for overall effect: Z = 0.03 (P = 0.98)				
3 TLH versus VH				
Subtotal (95% CI)	**0**	**0**		**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)				
Heterogeneity: not applicable				
Test for overall effect: not applicable				
4 Non-categorisable LH versus VH				
Subtotal (95% CI)	**0**	**0**		**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)				
Heterogeneity: not applicable				
Test for overall effect: not applicable				
Total (95% CI)	**139**	**137**		**0.98 [0.22, 4.39]**
Total events: 3 (LH), 3 (VH)				
Heterogeneity: Chi^2 = 0.87, df = 2 (P = 0.65); I^2 =0.0%				
Test for overall effect: Z = 0.03 (P = 0.98)				



Analysis 6.14. Comparison 6 LH subcategory analyses versus VH, Outcome 14 Wound/abdominal wall infection.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 14 Wound/abdominal wall infection

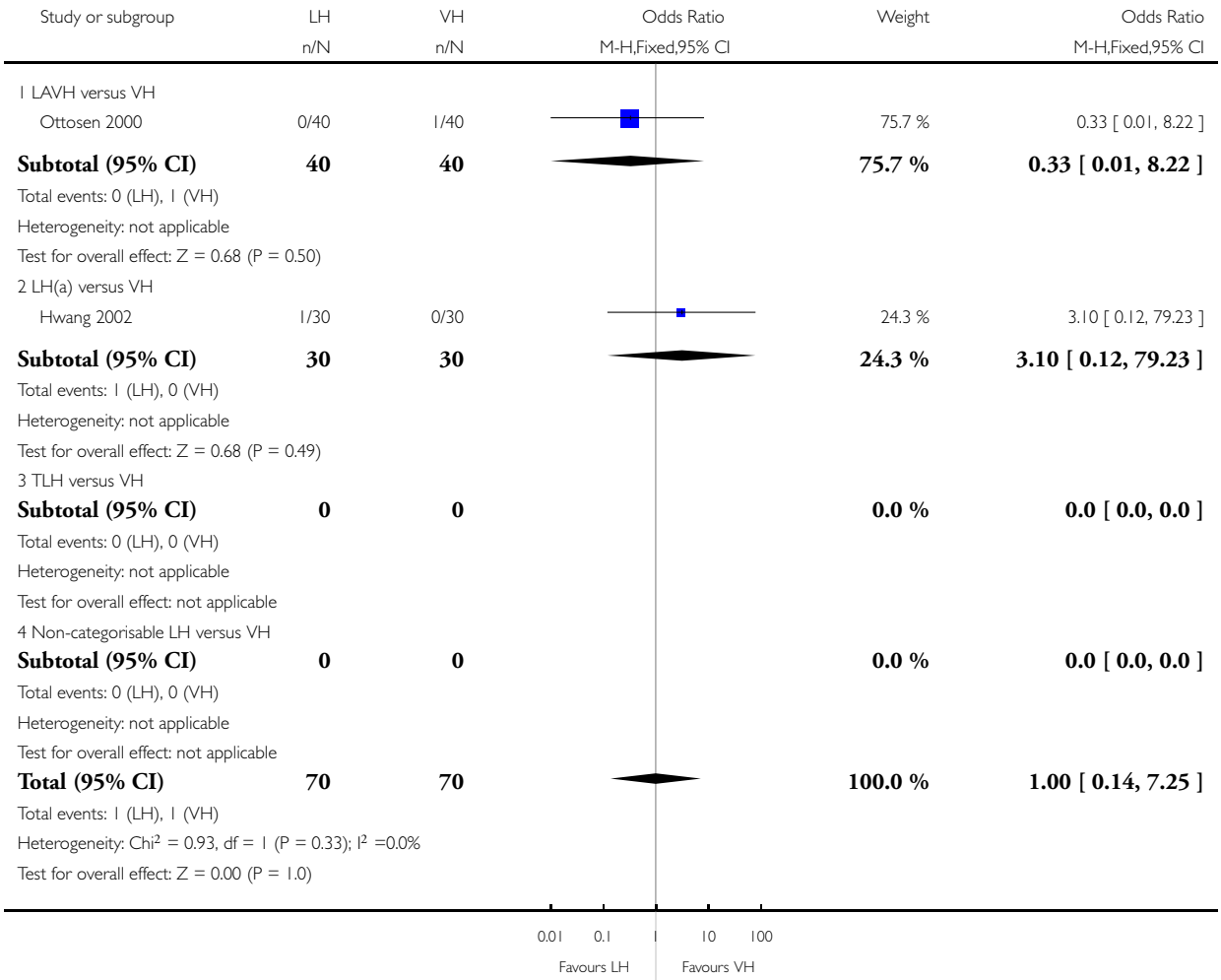
Study or subgroup	LH n/N	VH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
2 LH(a) versus VH					
Darai 2001	1/40	0/40		100.0 %	3.08 [0.12, 77.80]
Subtotal (95% CI)	**40**	**40**		**100.0 %**	**3.08 [0.12, 77.80]**
Total events: 1 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.68 (P = 0.50)					
3 TLH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
4 Non-categorisable LH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
Total (95% CI)	**40**	**40**		**100.0 %**	**3.08 [0.12, 77.80]**
Total events: 1 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.68 (P = 0.50)					

Analysis 6.15. Comparison 6 LH subcategory analyses versus VH, Outcome 15 Urinary tract infection.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 15 Urinary tract infection



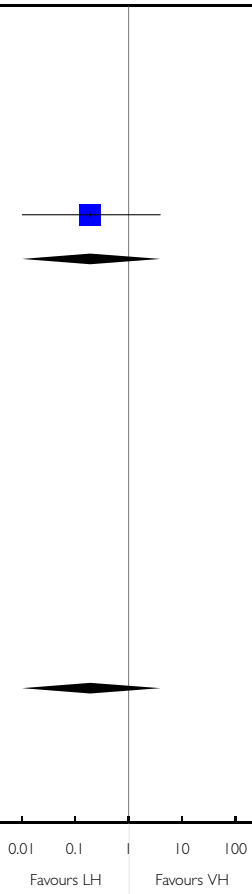
Analysis 6.16. Comparison 6 LH subcategory analyses versus VH, Outcome 16 Chest infection.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 16 Chest infection

Study or subgroup	LH n/N	VH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
2 LH(a) versus VH					
Hwang 2002	0/30	2/30		100.0 %	0.19 [0.01, 4.06]
Subtotal (95% CI)	**30**	**30**		**100.0 %**	**0.19 [0.01, 4.06]**
Total events: 0 (LH), 2 (VH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.07 (P = 0.29)					
3 TLH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
4 Non-categorisable LH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
Total (95% CI)	**30**	**30**		**100.0 %**	**0.19 [0.01, 4.06]**
Total events: 0 (LH), 2 (VH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.07 (P = 0.29)					

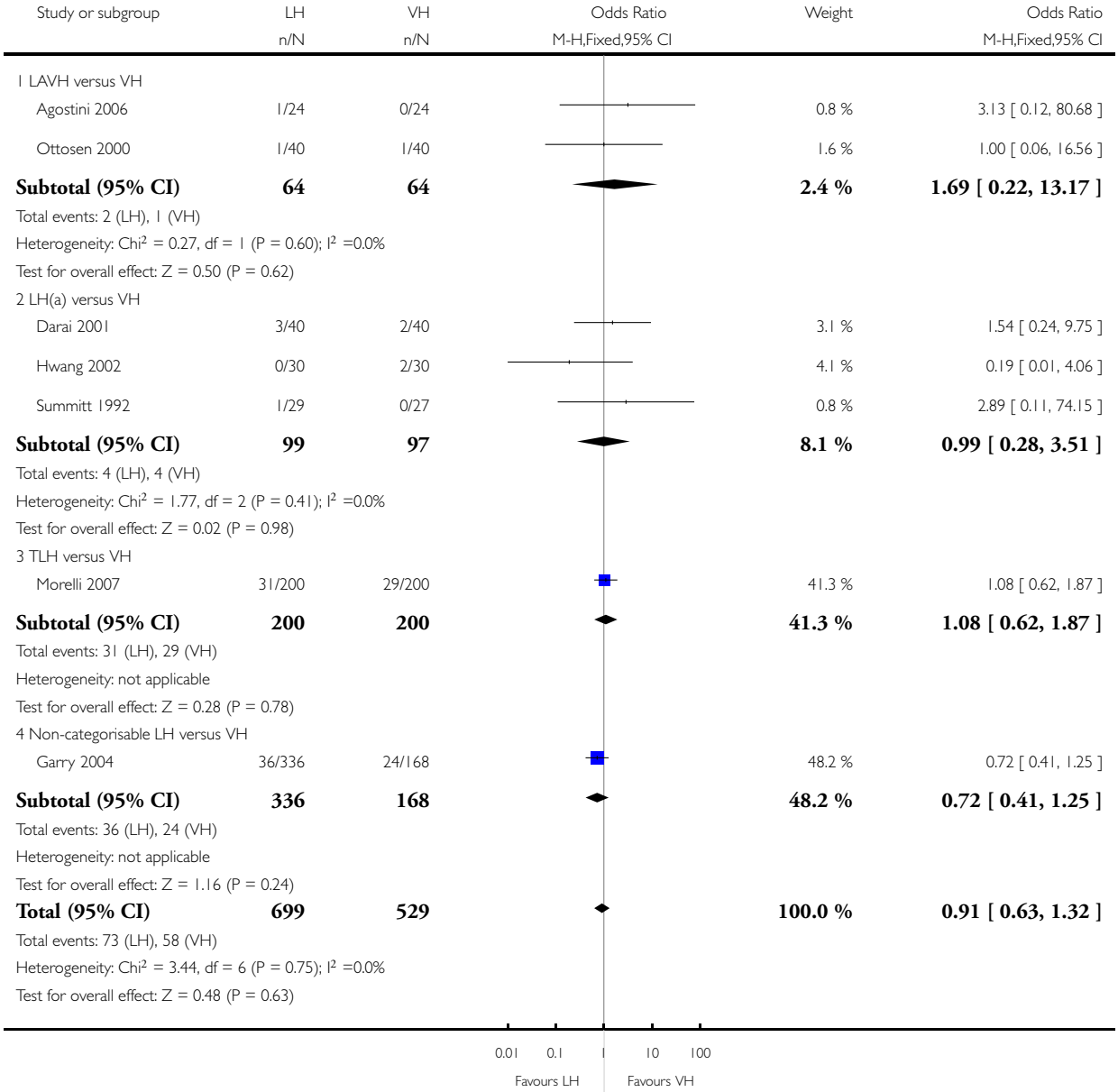


Analysis 6.17. Comparison 6 LH subcategory analyses versus VH, Outcome 17 Febrile episodes or unspecified infection.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 17 Febrile episodes or unspecified infection



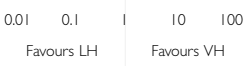
Analysis 6.18. Comparison 6 LH subcategory analyses versus VH, Outcome 18 Thromboembolism.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 18 Thromboembolism

Study or subgroup	LH n/N	VH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 LAVH versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
2 LH(a) versus VH					
Subtotal (95% CI)	**0**	**0**		**0.0 %**	**0.0 [0.0, 0.0]**
Total events: 0 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: not applicable					
3 TLH versus VH					
Morelli 2007	2/200	0/200		42.8 %	5.05 [0.24, 105.86]
Subtotal (95% CI)	**200**	**200**		**42.8 %**	**5.05 [0.24, 105.86]**
Total events: 2 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.04 (P = 0.30)					
4 Non-categorisable LH versus VH					
Garry 2004	2/336	0/168		57.2 %	2.52 [0.12, 52.76]
Subtotal (95% CI)	**336**	**168**		**57.2 %**	**2.52 [0.12, 52.76]**
Total events: 2 (LH), 0 (VH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.60 (P = 0.55)					
Total (95% CI)	**536**	**368**		**100.0 %**	**3.60 [0.42, 30.87]**
Total events: 4 (LH), 0 (VH)					
Heterogeneity: Chi^2 = 0.10, df = 1 (P = 0.75); I^2 =0.0%					
Test for overall effect: Z = 1.17 (P = 0.24)					

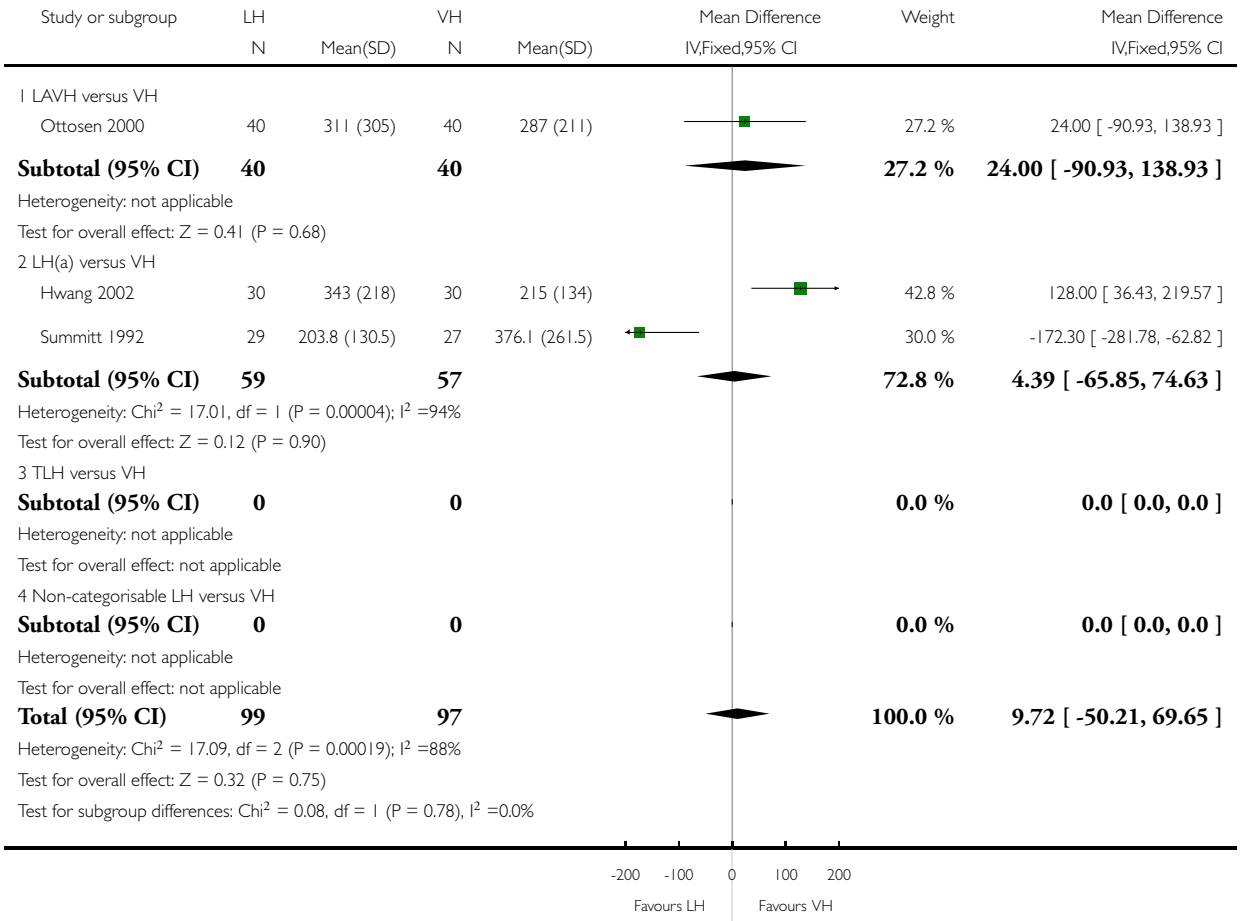


Analysis 6.19. Comparison 6 LH subcategory analyses versus VH, Outcome 19 Estimated blood loss (mls).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 19 Estimated blood loss (mls)

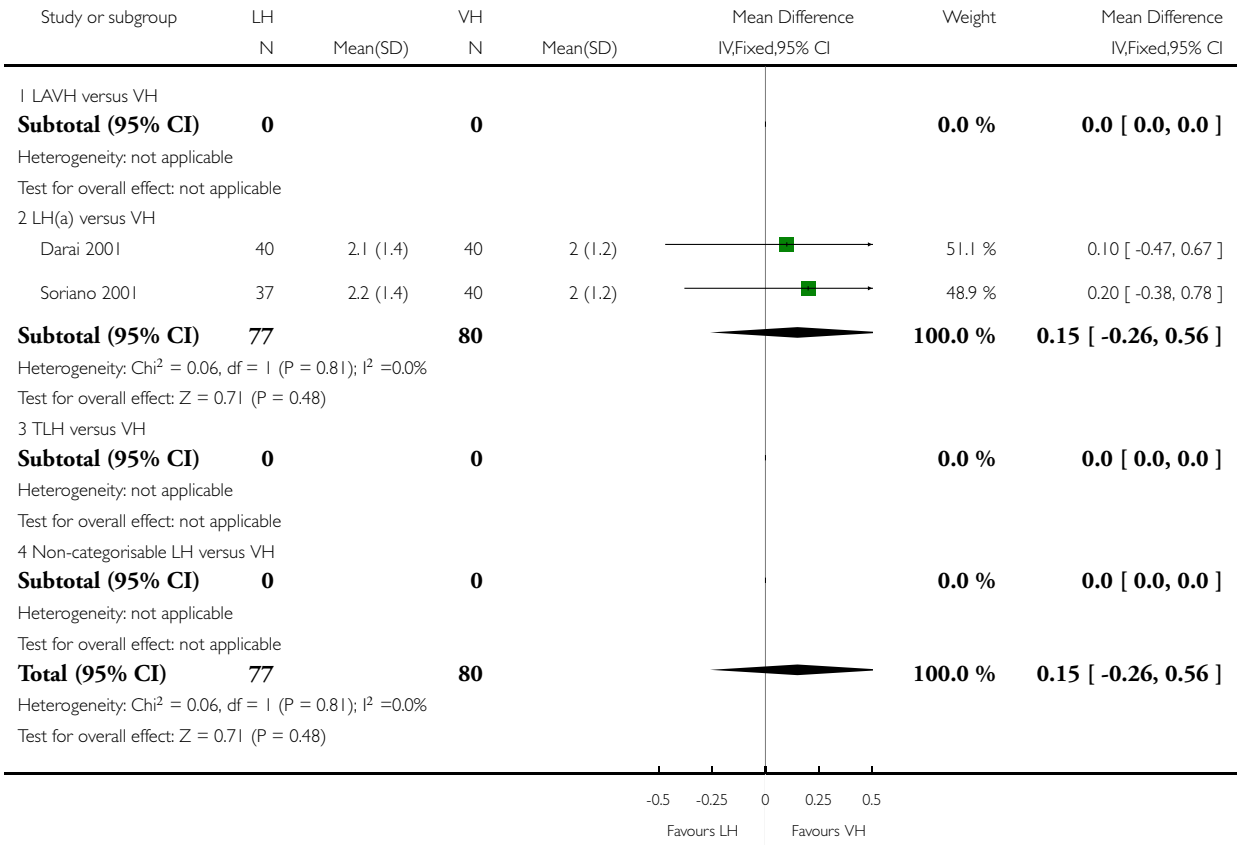


Analysis 6.20. Comparison 6 LH subcategory analyses versus VH, Outcome 20 Drop in haemoglobin.

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 20 Drop in haemoglobin

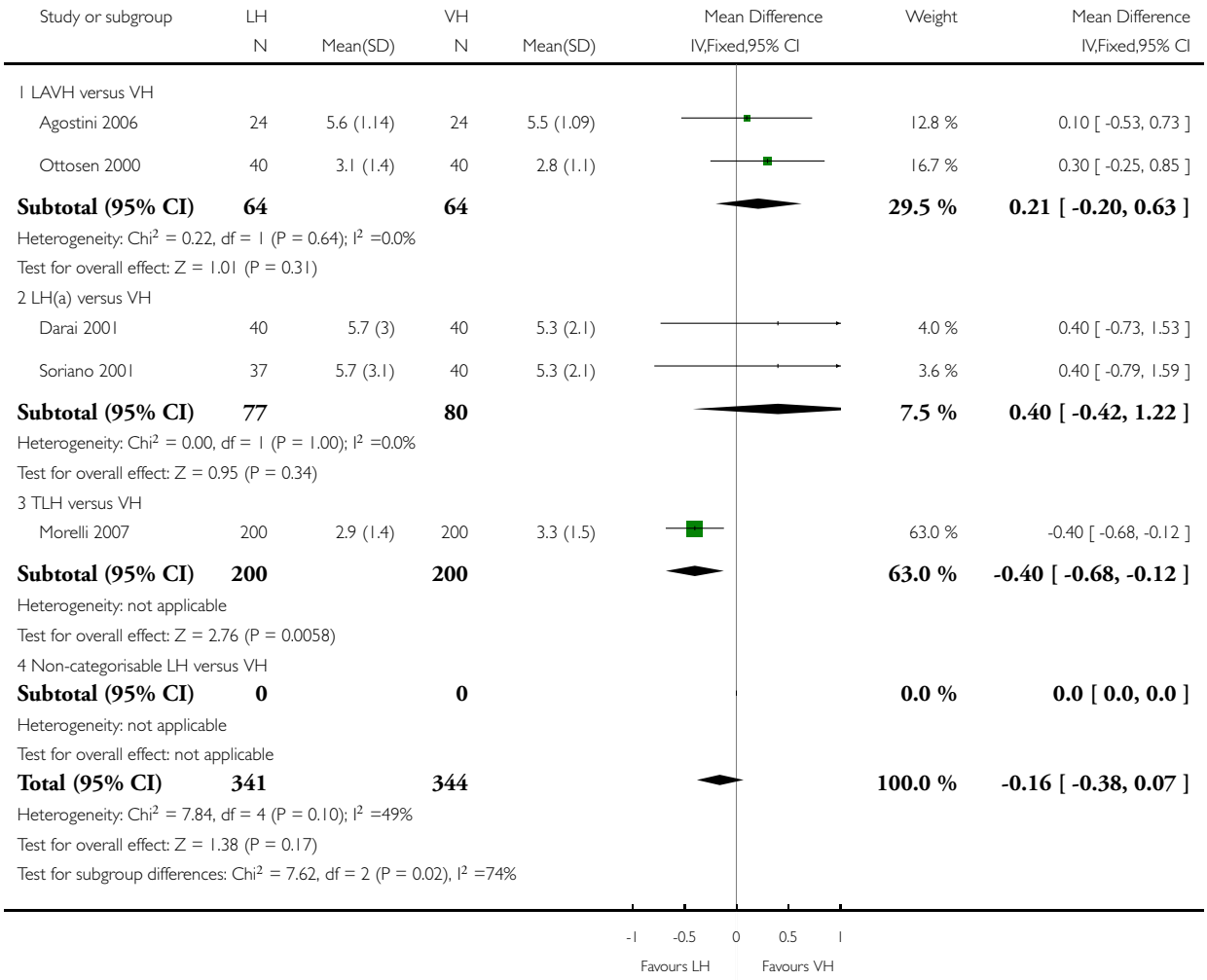


Analysis 6.21. Comparison 6 LH subcategory analyses versus VH, Outcome 21 Length of hospital stay (days).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 6 LH subcategory analyses versus VH

Outcome: 21 Length of hospital stay (days)

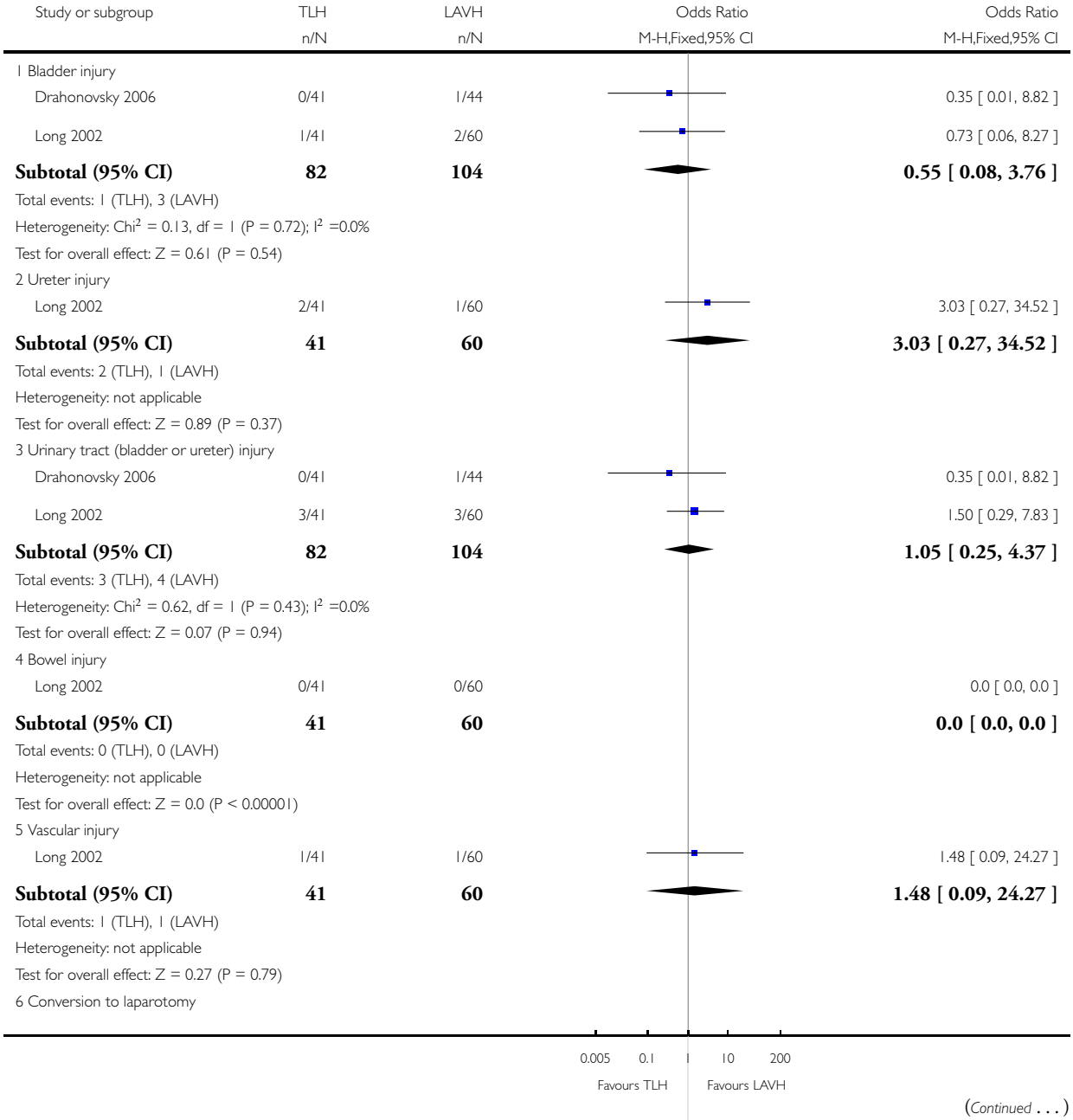


Analysis 7.1. Comparison 7 Comparison of different types of LH - TLH versus LAVH, Outcome 1 Intraoperative visceral injury (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 7 Comparison of different types of LH - TLH versus LAVH

Outcome: 1 Intraoperative visceral injury (dich)



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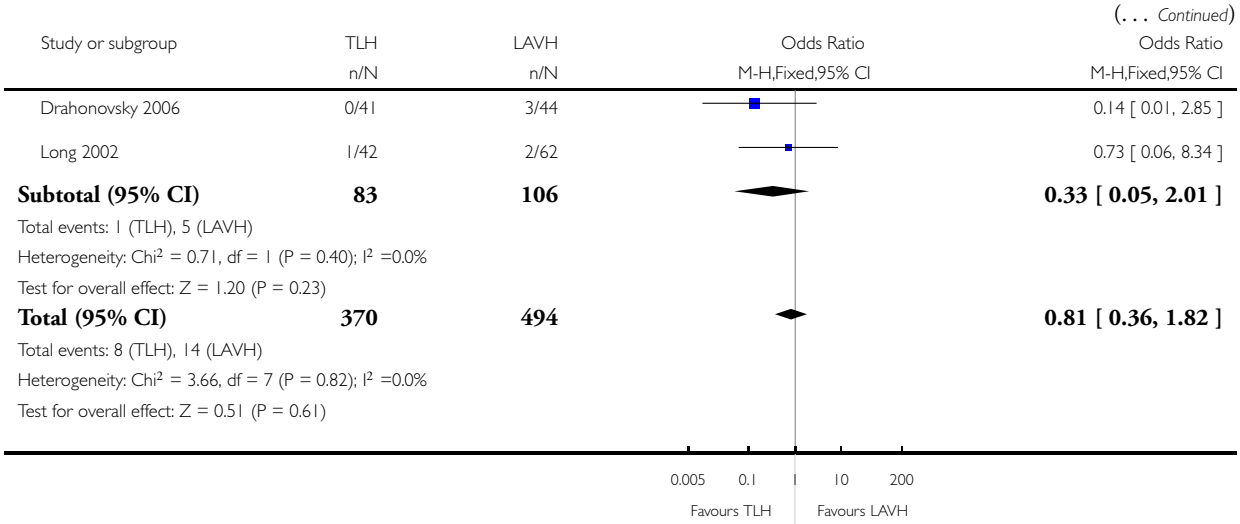
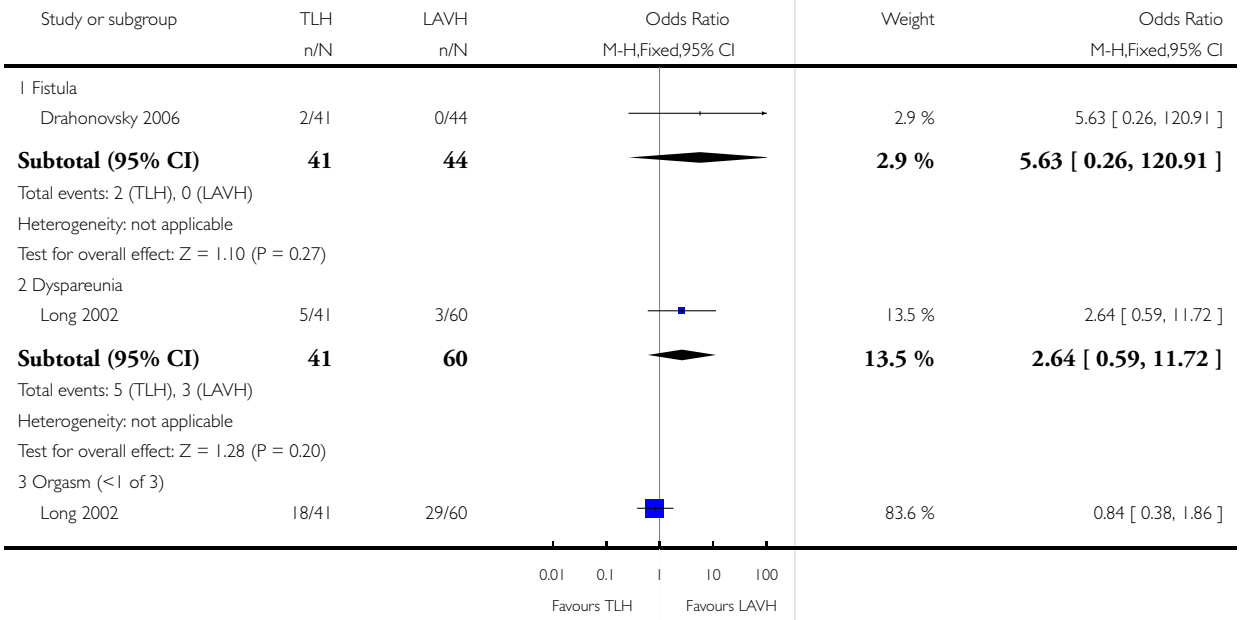


Analysis 7.2. Comparison 7 Comparison of different types of LH - TLH versus LAVH, Outcome 2 Long term complications (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease

Comparison: 7 Comparison of different types of LH - TLH versus LAVH

Outcome: 2 Long term complications (dich)



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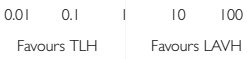
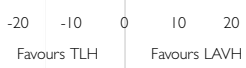
Study or subgroup	TLH n/N	LAVH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
Subtotal (95% CI)	**41**	**60**		**83.6 %**	**0.84 [0.38, 1.86]**
Total events: 18 (TLH), 29 (LAVH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.44 (P = 0.66)					
Total (95% CI)	**123**	**164**		**100.0 %**	**1.22 [0.63, 2.37]**
Total events: 25 (TLH), 32 (LAVH)					
Heterogeneity: Chi² = 2.84, df = 2 (P = 0.24); I² =30%					
Test for overall effect: Z = 0.58 (P = 0.56)					



Analysis 7.3. Comparison 7 Comparison of different types of LH - TLH versus LAVH, Outcome 3 Operation time (mins).

Review: Surgical approach to hysterectomy for benign gynaecological disease
Comparison: 7 Comparison of different types of LH - TLH versus LAVH
Outcome: 3 Operation time (mins)

Study or subgroup	TLH N	Mean(SD)	LAVH N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Long 2002	41	140.4 (38.7)	60	115.1 (38.3)		100.0 %	25.30 [10.00, 40.60]
Total (95% CI)	**41**		**60**			**100.0 %**	**25.30 [10.00, 40.60]**
Heterogeneity: not applicable							
Test for overall effect: Z = 3.24 (P = 0.0012)							



Analysis 7.4. Comparison 7 Comparison of different types of LH - TLH versus LAVH, Outcome 4 Operation time (descriptive data).

Operation time (descriptive data)

Study	TLH	LAVH	Comment
Drahonovsky 2006	Anesthesia mean 135 (range 70-215) Skin to skin mean 111 (range 55-180)	Anesthesia mean 109 (range 50-180) Skin to skin mean 85 (range 40-150)	Anesthesia p<0.001 Skin to skin p<0.001

Analysis 7.5. Comparison 7 Comparison of different types of LH - TLH versus LAVH, Outcome 5 Other intraoperative complications: estimated blood loss (descriptive data).

Other intraoperative complications: estimated blood loss (descriptive data)

Study	TLH	LAVH	Comment
Drahonovsky 2006	Mean 184 mL (range 14-700)	Mean 306 mL (range 35-1300)	p=0.03
Long 2002	Median 90 mL (range 25-660)	Median 100 (range 30-750)	Mann Whitney U test, NS

Analysis 7.6. Comparison 7 Comparison of different types of LH - TLH versus LAVH, Outcome 6 Short term outcomes (dich).

Review: Surgical approach to hysterectomy for benign gynaecological disease

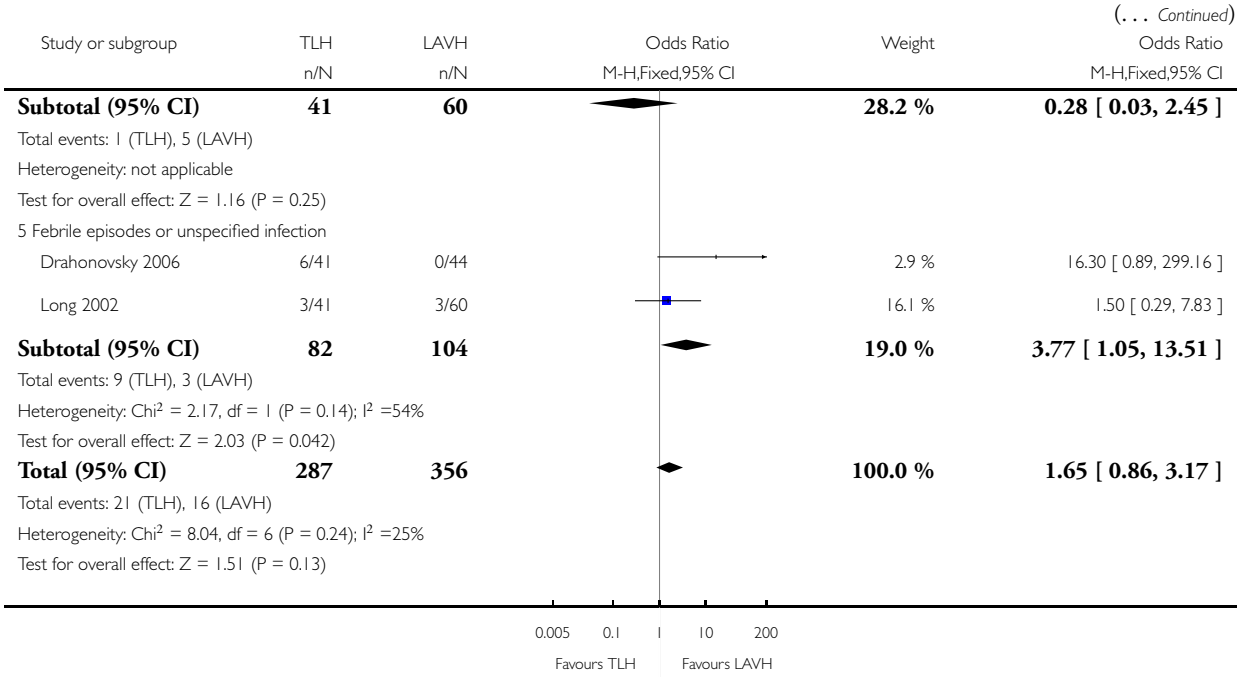
Comparison: 7 Comparison of different types of LH - TLH versus LAVH

Outcome: 6 Short term outcomes (dich)

Study or subgroup	TLH n/N	LAVH n/N	Odds Ratio M-H,Fixed,95% CI	Weight	Odds Ratio M-H,Fixed,95% CI
1 Transfusion					
Drahonovsky 2006	0/41	1/44		10.2 %	0.35 [0.01, 8.82]
Long 2002	2/41	4/60		22.0 %	0.72 [0.13, 4.11]
Subtotal (95% CI)	**82**	**104**		**32.2 %**	**0.60 [0.13, 2.76]**
Total events: 2 (TLH), 5 (LAVH)					
Heterogeneity: Chi^2 = 0.15, df = 1 (P = 0.70); I^2 =0.0%					
Test for overall effect: Z = 0.65 (P = 0.51)					
2 Pelvic hematoma					
Drahonovsky 2006	6/41	3/44		17.6 %	2.34 [0.55, 10.06]
Subtotal (95% CI)	**41**	**44**		**17.6 %**	**2.34 [0.55, 10.06]**
Total events: 6 (TLH), 3 (LAVH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.14 (P = 0.25)					
3 UTI					
Drahonovsky 2006	3/41	0/44		3.1 %	8.09 [0.41, 161.61]
Subtotal (95% CI)	**41**	**44**		**3.1 %**	**8.09 [0.41, 161.61]**
Total events: 3 (TLH), 0 (LAVH)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.37 (P = 0.17)					
4 Vaginal cuff infection					
Long 2002	1/41	5/60		28.2 %	0.28 [0.03, 2.45]

(*Continued* . . .)

(. . . *Continued*)



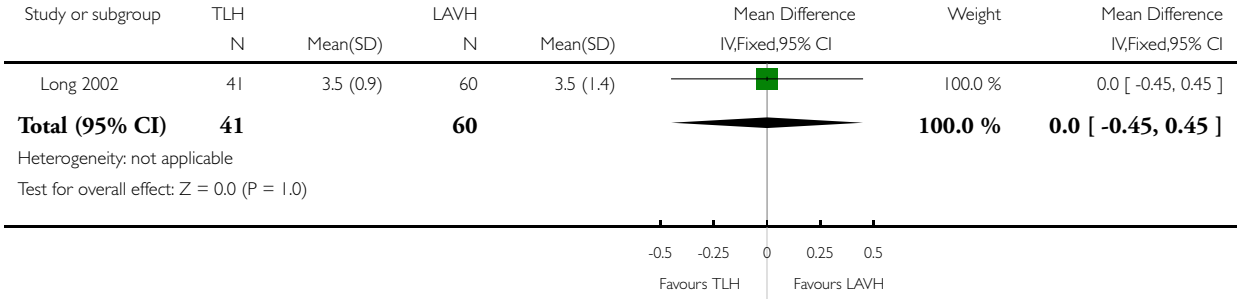
Analysis 7.7. Comparison 7 Comparison of different types of LH - TLH versus LAVH, Outcome 7 Pain relief (descriptive data).

Pain relief (descriptive data)

Study	TLH	LAVH	Comment
Postoperative analgesics			
Drahonovsky 2006	Tramadol 50 mg im. during hospitalization: mean 4.4 units.	Tramadol 50 mg im. during hospitalization: mean 3.4 units.	p=0.012

Analysis 7.8. Comparison 7 Comparison of different types of LH - TLH versus LAVH, Outcome 8 Length of hospital stay (days).

Review: Surgical approach to hysterectomy for benign gynaecological disease
Comparison: 7 Comparison of different types of LH - TLH versus LAVH
Outcome: 8 Length of hospital stay (days)



Analysis 7.9. Comparison 7 Comparison of different types of LH - TLH versus LAVH, Outcome 9 Length of hospital stay (descriptive data).

Length of hospital stay (descriptive data)

Study	TLH	LAVH	Comment
Drahonovsky 2006	mean 4.7 days (range 3-7)	mean 5.3 days (range 3-14)	p>0.05

APPENDICES

Appendix 1. CENTRAL

Cochrane Central Register of Controlled Trials (CENTRAL) in all fields (*The Cochrane Library* Issue 3, 2008)
1. Hysterectomy
2. Abdominal
3. Vaginal
4. Laparoscopic assisted
5. Laparo-vaginal
6. Laparoscopic
7. 1 and 2 or 3 or 4 or 5 or 6

Appendix 2. MEDLINE

Ovid MEDLINE(R) (1950 to August Week 4 2008)
1 randomised controlled trial.pt.
2 controlled clinical trial.pt.
3 Randomized controlled trials/
4 random allocation/
5 double-blind method/
6 single-blind method/
7 or/1-6
8 clinical trial.pt.
9 exp clinical trials/
10 (clin$ adj25 trial$).ti,ab,sh.
11 ((singl$ or doubl$ or tripl$ or trebl$) adj25 (blind$ or mask$)).ti,ab,sh.
12 placebos/
13 placebo$.ti,ab,sh.
14 random$.ti,ab,sh.
15 Research design/
16 or/8-15
17 animal/ not (human/ and animal/)
18 7 or 16
19 18 not 17
20 exp HYSTERECTOMY/
21 Hysterectom$.tw.
22 20 or 21
23 abdom$.tw.
24 vaginal$.tw.
25 (Lap$ adj Assist$).tw.
26 (Lap$ adj Vaginal$).tw.
27 LAVH.tw.
28 LH.tw.
29 or/23-28
30 22 and 29
31 route$.tw.
32 technique$.tw.
33 approach$.tw.
34 or/31-33
35 30 and 34
36 19 and 35

Appendix 3. EMBASE

EMBASE (1980 to week 36 2008)
1 Controlled study/ or randomised controlled trial/
2 double blind procedure/
3 single blind procedure/
4 crossover procedure/
5 drug comparison/
6 placebo/
7 random$.ti,ab,hw,tn,mf.
8 latin square.ti,ab,hw,tn,mf.
9 crossover.ti,ab,hw,tn,mf.
10 cross-over.ti,ab,hw,tn,mf.

11 placebo$.ti,ab,hw,tn,mf.
12 ((doubl$ or singl$ or tripl$ or trebl$) adj5 (blind$ or mask$)).ti,ab,hw,tn,mf.
13 (comparative adj5 trial$).ti,ab,hw,tn,mf.
14 (clinical adj5 trial$).ti,ab,hw,tn,mf.
15 or/1-14
16 nonhuman/
17 animal/ not (human/ and animal/)
18 or/16-17
19 15 not 18
20 exp HYSTERECTOMY/
21 hysterectom$.tw.
22 20 or 21
23 abdom$.tw.
24 vaginal$.tw.
25 (Lap$ adj Assist$).tw.
26 (Lap$ adj Vaginal$).tw.
27 LAVH.tw.
28 LH.tw.
29 or/23-28
30 exp Surgical Technique/
31 route$.tw.
32 technique$.tw.
33 approach$.tw.
34 or/30-33
35 22 and 29
36 34 and 35
37 19 and 36

Appendix 4. BIOLOGICAL ABSTRACTS

Biological Abstracts (1969 to August 2008)
1 exp HYSTERECTOMY/ (0)
2 hysterectom$.tw. (10663)
3 1 or 2 (10663)
4 abdom$.tw. (149794)
5 vaginal$.tw. (31662)
6 (lap$ adj assist$).tw. (691)
7 (lap$ adj5 vaginal$).tw. (540)
8 LAVH.tw. (71)
9 LVH.tw. (1654)
10 Laparoscop$.tw. (16487)
11 route$.tw. (373620)
12 technique$.tw. (3259392)
13 approach$.tw. (354093)
14 laparo$.tw. (29111)
15 or/4-14 (3796162)
16 3 and 15 (7312)
17 limit 16 to yr="2007 - 2008" (529)
18 from 17 keep 1-529 (529)

WHAT'S NEW

Last assessed as up-to-date: 4 February 2008.

Date	Event	Description
8 November 2010	New search has been performed	Following the receipt of feedback this review shall now be urgently updated. This update shall 1. incorporate the feedback received 2. reflect a major revision of the effect estimates for outcomes listed in comparisons 5 and 6 In the interim readers are advised to interpret the findings with caution.

HISTORY

Protocol first published: Issue 2, 2002

Review first published: Issue 1, 2005

Date	Event	Description
12 February 2009	New citation required and conclusions have changed	New authors: Theodoor E Nieboer, Sabine van Voorst, Ben Willem J Mol, Kirsten B Kluivers. Seven new studies have been included. The following comparisons became statistically significant in the present update: a shorter operation time in LAVH compared to TLH; more substantial bleeding in LH compared to VH; more febrile episodes or unspecified infections in TLH compared to LAVH; higher score on sub scale vitality after LH compared to AH; higher satisfaction in VH compared to AH. New comparison: TLH versus LAVH
9 June 2008	Amended	Converted to new review format.
5 February 2008	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

Theodoor E Nieboer: selected trials and extracted data for the current update, wrote current update of the review.

Neil Johnson: conceptualised the first review, wrote the protocol and the review, having supervised the selection of trials and data extraction.

Anne Lethaby: commented the protocol, assisted with selection of trials, data extraction, data entry and commented on the review.

Emma Tavender: trial selection, data extraction, trial quality assessment, data entry, wrote part of the description of studies and the methodological quality of included studies sections and commented on the review.

Elizabeth Curr: trial selection, data extraction and commented on the first review.

Ray Garry: commented on the protocol and the review.

Sabine van Voorst: assisted and checked the reversion of data into Review Manager 5

Ben Willem Mol: supervised the current update

Kirsten Kluivers: selected trials and extracted data for the current update, wrote current update of the review and supervised the current update.

DECLARATIONS OF INTEREST

Ray Garry is the principal investigator in a UK-based multicentre randomised trial comparing LH with both AH and VH (Garry 2004).

NJ is involved in fertility and endometriosis research with the University of Auckland, has a public hospital appointment at Auckland District Health Board, and private appointments with private medical practice groups called Endometriosis Auckland and IVF Auckland (with whom he is a shareholder); NJ has accepted funding towards conference expenses and research meetings from the following industry sponsors within the last 5 years, none of these sums being greater than $5,000 US dollars: Organon, Serono, Schering, and Device Technologies.

INDEX TERMS

Medical Subject Headings (MeSH)

Genital Diseases, Female [*surgery]; Hysterectomy [adverse effects; *methods]; Hysterectomy, Vaginal [adverse effects; methods]; Laparoscopy [adverse effects; *methods]; Randomized Controlled Trials as Topic

MeSH check words

Female; Humans