Laparoscopic-assisted vaginal hysterectomy vs abdominal hysterectomy for benign disease: a meta-analysis of randomized controlled trials

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CRD summary
This review found that laparoscopic-assisted vaginal hysterectomy was associated with a number of beneficial peri-operative and post-operative outcomes compared with abdominal hysterectomy. The review was well conducted and the authors' conclusion is likely to be reliable.

Authors' objectives
To evaluate the clinical outcomes of laparoscopic-assisted vaginal hysterectomy (LAVH) compared with abdominal hysterectomy in patients with benign disease.

Searching
PubMed, EMBASE, Web of Science, ProQuest, The Cochrane Library and the China Biological Medicine Database were searched to July 2010 for relevant articles with no language restrictions; search terms were reported. The reference lists of retrieved articles and previously published systematic reviews and meta-analyses were also checked for additional studies.

Study selection
Published randomised controlled trials that compared LAVH to abdominal hysterectomy in women with benign disease were eligible for inclusion. Inclusion criteria had to be clearly defined. At least one of the following outcomes had to be reported: operative time; blood loss; length of hospital stay; post-operative pain (measured on a 0-10 point visual analogue scale); haemoglobin decreases; and return to activities of daily living. Also eligible were peri-operative complications, classified as major (visceral damage to the bladder, ureter or bowel, vaginal vault dehiscence and other life-threatening complications such as thromboembolic disease) and minor (pelvic haematoma, febrile morbidity, anaesthetic problems, vault granulation and blood transfusion requirements). Studies of patients with malignant disease, and studies from which outcome data could not be collected were excluded from the review.

The disorders for which hysterectomies were scheduled included pelvic endometriosis, previous laparotomies, uterine leiomyomata, tubo-ovarian abscess, pelvic inflammatory disease requiring intravenous antibiotic therapy, adnexal mass in presence of indicated hysterectomy, and presentation of a large uterus (over 14 weeks gestation). Some laparoscopically-assisted vaginal hysterectomies included the uterine artery ligation.

Two reviewers independently performed the study selection; any disagreements were resolved by discussion.

Assessment of study quality
Two independent reviewers assessed methodological quality using the Cochrane Collaboration's Risk of Bias assessment tool in terms of randomisation, allocation concealment, blinding, the completeness of data and the extent to which the trials were free from selective reporting or other biases.

Data extraction
Two independent reviewers extracted data to calculate odds ratios (OR) for dichotomous variables, mean differences for continuous variables, and 95% confidence intervals for each estimate. The reviewers contacted study authors to locate missing data. Any disagreements between the reviewers were resolved by discussion.

Methods of synthesis
Pooled weighted mean differences (WMD), odds ratios and 95% confidence intervals for the summary estimates were calculated using a Mantel-Haenszel fixed-effect model, or a random-effects model if $I^2>50\%$, (indicating significant heterogeneity). Statistical heterogeneity was assessed using the $X^2$ and $I^2$ tests. The reviewers conducted a random-effects meta-regression analysis to evaluate potential sources of heterogeneity (variables listed in the paper). Sensitivity analyses were carried out to explore the impact of using different analytical models, and by excluding one study at a
time. The reviewers evaluated the potential for publication bias by visual appraisal of funnel plots and the Egger's test was used to evaluate funnel plot asymmetry.

**Results of the review**
Twenty-three studies (2,051 patients) were included in the review. Adequate randomisation was reported in 17 studies, and 11 studies reported satisfactory allocation concealment measures. Only one study reported adequate blinding and eleven studies reported sample size calculations and defined primary outcomes. Five studies reported drop-outs and of these, two studies reported using intention-to-treat analyses. Sixteen studies appeared to be free from other sources of bias.

Random-effects models were used for operation time, blood loss, hospital stay and return to normal activities because of significant statistical heterogeneity.

Statistically significant benefits were observed with LAVH compared with abdominal hysterectomy with reductions in blood loss (WMD -47.92ml, 95% CI -77.79 to -18.06; I²=91%; 13 studies), hospital stay (WMD -2.11 days, 95% CI -2.63 to -1.59 days; I²=96%; 13 studies), smaller haemoglobin drop (WMD -0.52 g/100ml, 95% CI -0.73 to -1.31g/100 ml; I²= 0%; four studies), quicker time to normal activity (WMD -13.32 days, 95% CI -16.67 to -9.88 days, I²= 71%; six studies) fewer minor complications (OR 0.50, 95% CI 0.36 to 0.70; I²=14%; 17 studies) fewer overall complications (OR 0.60, 95% CI 0.44 to 0.81, I²= 9%, 18 studies) and less post-operative pain on days one to three post-surgery.

The use of LAVH was associated with significantly longer operation time (WMD 13.62 minutes, 95% CI 4.60 to 22.65 minutes, I²= 96%, 15 studies) and more major complications (OR 2.54, 95% CI 1.13 to 5.70, I²=0%, eight studies) compared with abdominal hysterectomy.

Meta-regression analyses showed that power calculations and adequate sequence generation were potential sources of heterogeneity for outcomes of length of hospital stay. No single study had an undue influence of overall estimates of mean differences. Sensitivity analyses showed similar results were obtained with fixed-effect and random-effects models except LAVH was associated with shorter operation times, greater blood loss, shorter hospital stay and a slightly slower return to normal activity when the results were analysed using a fixed-effect model.

The results of the Egger's test showed no evidence of publication bias.

**Authors' conclusions**
Laparoscopic-assisted vaginal hysterectomy was associated with longer operative times, faster return to normal activity, and reductions in blood loss, length of hospital stay, post-operative pain, peri-operative complications and smaller haemoglobin drop than abdominal hysterectomy.

**CRD commentary**
The review addressed a clearly defined question and criteria for the inclusion of studies in the review were well defined and reproducible. Several appropriate electronic databases were searched without language restrictions. The restriction of the review to published studies meant there was some risk of publication bias, but the authors evaluated the potential for this with validated methods. Steps were taken by the reviewers to minimise errors and biases at each stage of the review process. The reviewers' decision to combine the results of the review in a meta-analysis appeared to be justified and potential sources of heterogeneity were explored using appropriate meta-regression and sensitivity analyses.

The authors correctly acknowledged the limitations of the review related to heterogeneity in disease type necessitating hysterectomy, surgical procedures and skill levels of surgeons. In general, the review was well conducted and the authors' conclusion is likely to be reliable.

**Implications of the review for practice and research**
**Practice:** The authors stated that the greatest benefits of LAVH surgery were attained with the appropriate selection of patients and surgeons, as surgeon experience was likely to have an impact on the incidence of major complications such as bladder and urinary tract injuries.

**Research:** The authors stated that more trials were required with data on quality of life, as few studies have reported this outcome.
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