Needlescopic versus laparoscopic cholecystectomy: a meta-analysis

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CRD summary
The authors concluded that needlescopic cholecystectomy was safe and effective for gallstone disease. It was as effective as laparoscopic cholecystectomy for complications and hospital stay, and better for postoperative pain, but had longer operative times and higher conversion rates. Much of the review was well-conducted, but a more tentative conclusion may have better reflected limited data and inconsistencies among studies.

Authors' objectives
To compare the effectiveness and safety of needlescopic cholecystectomy and laparoscopic cholecystectomy in patients with cholelithiasis.

Searching
PubMed, EMBASE, CINAHL and The Cochrane Library were searched for studies published between 1992 and January 2007. Search terms were reported. Reference lists were screened. Additional studies were sought using the related article function. No language restrictions were applied.

Study selection
Randomised controlled trials (RCTs) that compared needlescopic cholecystectomy with conventional laparoscopic cholecystectomy in patients with cholelithiasis were eligible for inclusion. The review defined needlescopic cholecystectomy as use of an umbilical port of 5mm to 10mm and at least two ports of 2mm. Cumulative port size had to be 32mm for laparoscopic cholecystectomy and 14mm to 19mm for needlescopic cholecystectomy. Review outcomes were operative time, total hospital stay, intra-operative and postoperative complications, postoperative pain, cosmetic results and conversion rate (needlescopic cholecystectomy to laparoscopic cholecystectomy or open and from laparoscopic cholecystectomy to open).

Publication dates of included studies ranged from 2000 to 2005.

Two reviewers independently selected studies.

Assessment of study quality
Validity was assessed using reporting of inclusion and exclusion criteria, randomisation method, sample size calculation, baseline comparability, blinding, cross-over, loss to follow-up, allocation concealment and intention-to-treat (ITT) analysis.

The authors did not state how many reviewers assessed validity.

Data extraction
Where required, outcome units for visual analogue scales (VAS) were converted to standard formats (0 to 10 scale). Differences between studies were calculated as effect sizes (Hedges g).

Two reviewers independently extracted data.

Methods of synthesis
Pooled standardised mean differences (SMDs) in effect sizes with 95% confidence intervals (CI) were calculated using an inverse variance fixed-effect model and DerSimonian and Laird random-effects model. Statistical heterogeneity was assessed using the Q statistic. Differences between studies were noted in tables. Forest plots were presented. The authors stated that attempts to assess publication bias using a funnel plot were limited by the small numbers of studies.
Results of the review

Six RCTs were included (n=317 patients). Sample size ranged from 13 to 38. According to the table four studies reported allocation concealment and five reported blinding; according to the text none of the studies clearly reported allocation concealment or blinding. All studies reported inclusion and exclusion criteria, baseline comparability and the randomisation method. Four studies used intention-to-treat analysis. Only one study reported loss to follow-up. Two studies reported crossover.

Needlescopic cholecystectomy was associated with a significantly longer operating time (SMD random-effects model 0.44, 95% CI 0.01 to 0.8, significant heterogeneity p=0.004; six studies) and a significantly higher conversion rate than laparoscopic cholecystectomy (SMD 0.14 fixed effect model, 95% CI 0.05 to 0.41, no significant heterogeneity; six studies).

There was no statistically significant difference between needlescopic cholecystectomy and laparoscopic cholecystectomy for intraoperative complications (six studies), postoperative complications (six studies) and total hospital stay (four studies).

Needlescopic cholecystectomy was associated with significantly less postoperative pain (SMD random effects model -0.08, 95% CI -1.4 to -0.18, significant heterogeneity p=0.0001; five studies) and significantly improved cosmetic results (SMD fixed-effect model -0.4, 95% CI -0.71 to -0.15, significant heterogeneity p=0.0000; five studies).

Authors’ conclusions

Needlescopic cholecystectomy was a safe and effective procedure for management of gallstone disease. It was as effective as laparoscopic cholecystectomy for perioperative complications and total hospital stay, was superior to laparoscopic cholecystectomy for less postoperative pain and had better cosmetic results. But it was associated with longer operative times and a higher conversion rate.

CRD commentary

The review question was clearly stated and inclusion criteria were appropriately defined. Several relevant sources were searched. Attempts were made to minimise language bias. No attempts were made to minimise publication bias. Methods were used to minimise reviewer errors and bias in study selection and data extraction; it was unclear whether similar steps were taken during validity assessment. Study validity was assessed and results were presented, although there appeared to be inconsistencies between text and table. No information was provided about patients, which made it difficult to assess generalisability of findings. Data were pooled using effect sizes, which made it difficult to interpret some outcomes. Several analyses were based on very low event rates (for example, only two patients experienced intraoperative complications), which meant that some findings may not be reliable. Heterogeneity was found for several analyses; the authors acknowledged that some results were inconsistent among studies, but this did not seem to be reflected in their conclusion. Much of the review was well-conducted, but a more tentative conclusion may have better reflected the limited data and inconsistencies among studies for some outcomes.

Implications of the review for practice and research

Practice: The authors stated that needlescopic cholecystectomy can be recommended as a routine procedure for removal of the gallbladder and may be considered an alternative while stronger evidence is awaited. They also stated that it would not be appropriate to recommend needlescopic cholecystectomy for all gallbladder surgery.

Research: The authors stated that there was a need for a multicentre double-blind RCTs to evaluate needlescopic cholecystectomy.

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