Laparoscopic vs open pyloromyotomy: a systematic review and meta-analysis

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CRD summary
This review compared the effectiveness of laparoscopic pyloromyotomy and open pyloromyotomy as effective interventions in infants with hypertrophic pyloric stenosis and concluded that laparoscopic pyloromyotomy significantly reduced the rate of total complications. Given the lack of an assessment of study quality, small sample sizes and uncertainty over parts of the review process, the findings should be interpreted with caution.

Authors' objectives
To determine whether laparoscopic pyloromyotomy or open pyloromyotomy is the most effective intervention in infants with hypertrophic pyloric stenosis.

Searching
PubMed and The Cochrane Library were searched from 1966 to February 2009; search terms were not reported. Bibliographies were scanned for additional studies. Experts were contacted for additional studies and unpublished data.

Study selection
Prospective randomised and non randomised studies that compared laparoscopic pyloromyotomy and open pyloromyotomy for the treatment of infants with hypertrophic pyloric stenosis were eligible for inclusion. Outcomes comprised intraoperative and postoperative complications (gastrointestinal perforation, serosal laceration, pyloromyotomy, wound infections, wound dehiscence and incisional hernia) together with duration of operation, time to full feeding, postoperative vomiting and postoperative length of stay. Mean age ranged from 31 to 44.2 days, mean weight ranged from 3,700g to 4,100g and mean pyloric channel length, where reported, from 19.4mm to 25mm.

The authors stated neither how the papers were selected for the review nor how many reviewers performed the selection.

Assessment of study quality
The authors stated that methodological quality was assessed, but methods and results were not reported.

Data extraction
Odds ratios (OR) were calculated from data for dichotomous outcomes and mean differences (MD) were calculated for continuous measures, together with with 95% confidence intervals (CI).

Two reviewers extracted data. Differences were resolved by consensus.

Methods of synthesis
A Mantel-Haenszel fixed-effect model was used to calculate pooled odds ratios plus 95% CI for the dichotomous outcomes. A fixed-effects model weighted by inverse variance was used to estimate the pooled mean differences plus 95% CI for continuous measures. Heterogeneity was assessed using the Χ² statistic. Publication bias was investigated using funnel plots.

Results of the review
Six studies were included in the review (n=625, range 20 to 200, totals of 303 laparoscopic pyloromyotomy and 322 open pyloromyotomy); five RCTs and one prospective cohort study.

For patients who underwent laparoscopic pyloromyotomy: Total complications were lower (OR 0.58, 95% CI 0.35 to 0.97, p=0.04), due mainly to a lower wound complication rate (OR 0.42 for laparoscopic pyloromyotomy, 95% CI 0.20 to 0.91, p=0.03); there was a shorter time to full feedings (MD -11.52 hours, 95% CI -12.77 to -10.27, p<0.00001) and
shorter postoperative length of stay (MD -5.71 hours, 95% CI -8.90 to -2.52, p=0.0005).

There was no significant heterogeneity for complications, but there was significant heterogeneity for time to full feedings and postoperative length of stay. No statistically significant differences were noted in the rates of mucosal perforation, wound infection, postoperative emesis, pyloromyotomy or operating time.

**Authors' conclusions**
This meta-analysis favoured the laparoscopic approach with significantly reduced rate of total complications, due mostly to a lower wound complication rate.

**CRD commentary**
The review question was clear and supported by brief, but reproducible, inclusion criteria. A limited search of relevant databases was undertaken and there was an attempt to identify unpublished studies, but it was unclear whether language restrictions were applied; some studies may have been missed and language bias may have been present. An assessment of publication bias was undertaken, but the results were not reported. Appropriate steps were taken to minimise bias and errors in the extraction of data, but it was unclear whether such steps were also taken for the selection of studies. No assessment of study validity was reported, which made it difficult to assess the reliability of the included data. Methods used to pool results were appropriate. Heterogeneity was assessed and found to be present for continuous outcomes, but was not present for the complication rates. The results were clearly presented in the text and forest plots were used for the outcomes assessed. The authors' conclusions are supported by the data presented, but given the lack of an assessment of study quality, small sample sizes of the included studies and uncertainty over parts of the review process, the findings should be interpreted with caution.

**Implications of the review for practice and research**
**Practice:** The authors stated that surgeons who performed laparoscopic pyloromyotomy should ensure that the incision length should be 2cm (or at least longer than the ultrasound measured length of the pyloric channel) to avoid an incomplete pyloromyotomy.

**Research:** The authors did not state any implications for research.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.