Laparoscopic anterior 180-degree versus Nissen fundoplication for gastroesophageal reflux disease: systematic review and meta-analysis of randomized clinical trials

CRD summary
The authors concluded that at one and five years, dysphagia and gas-related symptoms were lower after 180-degree laparoscopic anterior fundoplication, than after laparoscopic Nissen fundoplication, with no differences in oesophageal acid exposure and oesophagitis. Small trial samples, possible publication bias, and some limitations in the review, make the reliability of these conclusions uncertain.

Authors' objectives
To compare 180-degree laparoscopic anterior fundoplication, with laparoscopic Nissen fundoplication, for patients who were having surgery for gastro-oesophageal reflux disease.

Searching
MEDLINE, EMBASE, The Cochrane Library, and CPCI-S were searched up to April 2012, with no language restrictions. Only full-text peer-reviewed articles were included. Search terms were reported, and the references of identified articles were searched.

Study selection
Randomised controlled trials (RCTs) were eligible if they compared 180-degree laparoscopic anterior fundoplication, with laparoscopic Nissen fundoplication, in adult patients with established gastro-oesophageal reflux disease, who were undergoing primary antireflux surgery. The main outcomes were oesophageal acid exposure, oesophagitis, the heartburn score (0 for no heartburn to 10 for severe heartburn), dilatation for dysphagia, the modified Dakkak dysphagia score (0 for no dysphagia to 45 for severe dysphagia), and the reoperation rate.

The included trials were published between 1999 and 2012. Hiatal repair was performed for all patients. Their age ranged from 43 to 59 years and most of them were male. All patients had proof of gastro-oesophageal reflux disease on upper endoscopy, 24-hour acidity (pH) monitoring, or both. Some trials included patients with oesophageal dysmotility.

Two reviewers independently selected trials for inclusion.

Assessment of study quality
Trial quality was assessed using the Cochrane risk of bias tool and the Jadad. The authors did not state how many reviewers were involved in quality assessment.

Data extraction
Data were extracted to calculate relative risks, mean differences, and 95% confidence intervals. Authors were contacted for additional data, if necessary. If there were missing outcomes, an equal distribution between both groups was assumed, and standard deviations were imputed either on the basis of ranges or on the basis of the average standard deviations reported by other trials for the same outcome. If both means and standard deviations were missing, they were imputed on the basis of the median and range, or median and interquartile range, as reported.

Two reviewers independently extracted the data; disagreements were resolved by discussion with a third reviewer.

Methods of synthesis
Pooled relative risks, with their 95% confidence intervals, or pooled mean differences (weighted or not), with their 95% confidence intervals, were calculated using a fixed-effect model where there was no evidence of heterogeneity, or a random-effects model (DerSimonian and Laird) otherwise. Outcomes were reported separately for one, five, and over five years. Statistical heterogeneity was assessed using X² and I²; where I² was over 50%, heterogeneity was considered to be present. Funnel plots were used to assess publication bias.
Trials with no events in both groups were excluded. Trials with no events in one group were included by adding a continuity correction of 0.5 to all cells. Sensitivity analysis was performed by removing these trials with no events in one group.

Results of the review
Five trials were included in the review (458 patients). The overall mean Jadad score was 4 (range 2 to 5). All trials had adequate sequence generation; three reported double blinding and allocation concealment; four reported loss to follow-up. All trials were free of other bias. The trials reported no deaths within one year.

The prevalence and severity of dysphagia were lower after 180-degree laparoscopic anterior fundoplication, compared with laparoscopic Nissen fundoplication, at one-year follow-up (prevalence RR 0.56, 95% CI 0.38 to 0.81; I²=0; five RCTs; severity WMD -2.25, 95% CI -2.66 to -1.83; I²=69%; three RCTs) and at five years (prevalence RR 0.67, 95% CI 0.47 to 0.94; I²=0; three RCTs; severity WMD -2.33, 95% CI -3.32 to -1.34; I²=31%; three RCTs).

There were no statistically significant differences between the two procedures in oesophageal acid exposure, and prevalence of oesophagitis at one year, prevalence and severity of heartburn at one and five years, the prevalence of regurgitation and proton pump inhibitor (PPI) use at one year, PPI use at five years, and the dilatation and reoperation rates at one and five years.

Gas bloating, increased flatulence, the inability to belch, and the inability to relieve bloating were lower with 180-degree laparoscopic anterior fundoplication at one-year follow-up. Similar results were found at five years, except that gas bloating was no longer significant.

Further secondary analyses and results beyond five years were reported. Sensitivity analyses, removing trials with no events in one group, produced similar results at one year (dilatation and in-hospital complications) and five years (dilatation).

The funnel plot for one-year oesophageal acid exposure did not suggest publication bias.

Authors’ conclusions
At one and five years, dysphagia and gas-related symptoms were lower after 180-degree laparoscopic anterior fundoplication, than after laparoscopic Nissen fundoplication. Oesophageal acid exposure and oesophagitis were similar after both procedures, with no differences in heartburn scores, patient satisfaction, dilatations, and the reoperation rate.

CRD commentary
The review question and inclusion criteria were clear. Relevant sources were searched, but unpublished trials were not sought, so relevant data might have been missed. No language restrictions were applied, which minimised the risk of language bias. Appropriate methods to reduce reviewer error and bias were used for data extraction and study selection, but not for quality assessment. Statistical heterogeneity was assessed and appropriate methods were used to pool the results.

The authors’ conclusions reflect the evidence, but the very small trial samples and possible publication bias, make the reliability of the conclusions uncertain, and the findings should be considered to be provisional.

Implications of the review for practice and research
The authors did not state any implications for practice and research.

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Record Status
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.