Minimally invasive versus open esophagectomy: meta-analysis of outcomes

CRD summary
The authors concluded that minimally invasive and open oesophagectomy yielded comparable outcomes. The authors' conclusions appeared to reflect the evidence, but given the small number of trials, uncertain trial quality, small sample sizes and potential for review bias, the conclusions should be interpreted with some caution.

Authors' objectives
To compare the perioperative outcome measures and oncological impact between minimally invasive oesophagectomy and open oesophagectomy.

Searching
PubMed, EMBASE and The Cochrane Library were searched from 1997 to 2009 for English-language studies; search terms were reported. Abstracts from national and international conferences (unspecified) were searched for additional studies.

Study selection
Intention-to-treat studies where at least one treatment arm underwent minimally invasive oesophagectomy (whole or part of the procedure) in patients who had oesophageal cancer or Barrett's esophagus with high-grade dysplasia or upper aerodigestive tract primary tumours for morbidity outcomes were eligible for inclusion. Eligible procedures were Ivor-Lewis oesophagectomy, left thoraco-abdominal approach, three-hole/McKeown oesophagectomy and transhiatal oesophagectomy. Studies of patients with Siewert type I cancer or who underwent emergency oesophagectomy, subtotal gastrectomy and primary colonic interposition were excluded. Primary outcomes included operative outcomes, morbidity, mortality and survival.

In the included studies, where stated, mean age ranged from 61 to 67.8 years and most patients were male. Five studies compared open oesophagectomy (thoracotomy/laparotomy) versus video-assisted thoracotomy/laparoscopy (total minimally invasive oesophagectomy) and three compared open oesophagectomy (thoracotomy/laparotomy) versus video-assisted thoracotomy/laparotomy (hybrid minimally invasive oesophagectomy). Comparisons between open surgery and thoracoscopy alone were made. In two studies patients also underwent transhiatal intervention.

Two reviewers independently selected studies for inclusion; disagreements were resolved through consensus.

Assessment of study quality
The authors did not state that they assessed study quality.

Data extraction
Numbers of participants and events were extracted to enable calculation of odds ratio (OR) and relative risk (RR) with 95% confidence intervals (CIs) for dichotomous outcomes. Continuous outcomes were measured using weighted mean difference (WMD) with 95% CIs. Study authors were contacted where data were unclear or not reported.

The authors did not state how many reviewers performed data extraction.

Methods of synthesis
Studies were pooled using a fixed-effects model except where significant heterogeneity was present, in which case a random-effects model was used. Heterogeneity was assessed using $I^2$ and $X^2$. Heterogeneity was explored by adding covariates to the model using the Moses-Shapiro-Littenberg method. Results that displayed a threshold effect were assessed by a receiver operating characteristics (ROC) curve.

Publication bias was assessed using Egger's test and funnel plots.
Results of the review
Eight studies (n=1,008 participants, range 11 to 446) were included in the review. Where reported, mean follow-up ranged from 6.3 to 36 months.

Open thoracotomy versus video-assisted thoracoscopy/laparoscopy oesophagectomy (total): There were significantly fewer total complications in the minimally invasive oesophagectomy group (OR 1.93, 95% CI 1.08 to 3.43, I²=43.8%; three studies) and fewer anastomotic strictures in the open thoracotomy arm (OR 0.11, 95% CI 0.04 to 0.31; two studies). The two procedures had comparable outcomes for other measures (removed lymph nodes, 30-day mortality, three-year survival).

Open thoracotomy versus video-assisted thoracoscopy oesophagectomy (hybrid): No differences were noted between the interventions for operative outcomes and survival (three studies).

There was no evidence of publication bias for either comparison.

Authors' conclusions
Both study arms were comparable with regard to perioperative results and prognosis. Further prospective comparative or randomised-controlled trials on the oncological impact of minimally invasive oesophagectomy were needed.

CRD commentary
The review question was clearly stated. Inclusion criteria were appropriately defined for study design, participants and intervention. Relevant outcomes were clearly stated. Several relevant sources were searched. The literature search was limited to articles in English, so language bias may have been introduced. Formal assessment showed no evidence of publication bias, but the reliability of the assessment was questionable as only a small number of studies were included. Methods were used to minimise reviewer error and bias for study selection; it was unclear whether similar methods were applied to data extraction. The authors did not report that they assessed study quality and this made the reliability of the findings uncertain; some of the included trials contained small sample sizes. The characteristics of the individual trials were presented. Studies were appropriately pooled using meta-analysis. Heterogeneity was assessed. The authors' acknowledged limitations in the review, which included the small sample sizes and variability across studies.

The authors' conclusions appeared to reflect the evidence, but given the small number of trials, uncertain trial quality, small sample sizes and potential for review bias, the conclusions should be interpreted with some caution.

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

Research: The authors stated that further sufficiently-powered prospective randomised controlled trials were required to assess the differences between minimally invasive oesophagectomy and open oesophagectomy.

Funding
None stated.

Bibliographic details

PubMedID
20186484
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.