**Endovascular stent-graft or open surgical repair for blunt thoracic aortic trauma: systematic review**

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**CRD summary**

This review found evidence to support endograft repair as a first-line therapy for the treatment of blunt thoracic aortic injury (BTAI) compared with conventional open surgical repair. However, the authors’ conclusions may not be reliable given concerns about the review methods, the quality of the data and the risk of publication bias.

**Authors’ objectives**

To determine the efficacy and safety of endovascular stent-graft repair of acute blunt traumatic thoracic aortic injury (BTAI) compared with conventional open surgical repair.

**Searching**

MEDLINE was searched for published studies between 1990 and March 2008. Search terms were reported. Reference lists of relevant studies were also checked.

**Study selection**

Studies comparing thoracic endovascular aortic repair (TEVAR) with open repair of BTAI, or studies of at least six participants with acute BTAI treated with TEVAR from a remote access site, were eligible for inclusion in the review. Studies of patients with multiple aetiologies, or studies with multiple treatments from which outcomes of interest could not be extracted separately for patients with BTAI, were excluded. The primary outcomes of interest were survival at 30 days and paraplegia rates. Secondary outcomes included incidence of endoleak (early and late) and access site complications.

Study designs included cohort and case series. A number of different stent-graft devices were reported: Ancure/AneuRx cuff, Braile, EndoFit, EVita, Excluder, Relay, TAG, Talent, TX1/2, Valient, Vanguard cuff, Zenith and homemade. The mean age in the cohort studies was 40 years in the TEVAR group and 38 years in the operative repair group. The mean injury severity score (ISS) in the cohort studies was 40 for the TEVAR group and 38 for the operative repair group. Mean follow-up was 24 months (range seven to 60 months) in the TEVAR group and 53 (range seven to 72 months) in the operative repair group in the cohort studies and mean follow-up in the case series was 18 months (range three to 36 months). Technical success (defined as successful introduction and deployment of graft without type I or type III endoleak, no significant obstruction and no mortality or surgical conversion at 24 hours) and rate of stroke was also reported, in addition to the primary and secondary outcomes of interest.

The authors did not state how papers were selected for the review or how many reviewers performed the selection.

**Assessment of study quality**

The authors did not state that they assessed validity.

**Data extraction**

Odds ratios (ORs) were calculated for the primary outcomes in the cohort studies. In addition, technical success rates and incidence of complications were calculated. Primary endoleak was defined as occurring within 30 days of the procedure, and secondary endoleaks as occurring after this period. Authors of the included reports were contacted where further detail was required. Data were extracted by two reviewers and any disagreements were resolved by a third reviewer.

**Methods of synthesis**

Cohort studies were pooled in a meta-analysis using a fixed-effect model for the primary outcomes (mortality and paraplegia). Summary estimates were reported as ORs with their associated 95% CIs. Statistical heterogeneity was assessed using the $I^2$ test and the $I$ statistic. Publication bias was assessed by visual inspection of a funnel plot.
Results of the review
Nineteen retrospective observational studies (262 endograft repairs and 376 open surgical repairs) and thirty-one case reports (n= 460) were included in the review.

Cohort studies: Endovascular repair was found to significantly reduce the risk of mortality (OR 0.43, 95% CI: 0.26, 0.70, p=0.009; 19 studies, n=638) and paraplegia (OR 0.30, 95% CI: 0.12, 0.76, p=0.01, 19 studies, n=638) compared with open surgical repair. No evidence of statistical heterogeneity was found. The authors reported that systemic complications with endovascular repair were reduced compared with operative repair (five studies). The weighted pooled mean procedure times were 148 minutes (range 97 to 165) for TEVAR and 238 minutes (range 174 to 280) for operative repair. Intensive care stay and mean hospital stay were comparable in both treatment arms.

Cohort plus case series: Overall, the 30-day mortality rate for TEVAR was 7.6%, of which 16.3% were procedure related. Incidence of procedure related paraplegia was 0.75%, early endoleak incidence was 4.2%, late endoleak incidence was 0.9%, stroke or transient ischemic attack incidence was 1.2%. The incidence of access site complications that required intervention was 4.1% in 667 endovascular repair survivors.

There was no evidence of publication bias.

Authors' conclusions
Stent-graft repair was found to be a successful technique that may reduce mortality and paraplegia compared with open surgery. The results support endograft repair as first-line therapy for blunt thoracic aortic trauma.

CRD commentary
The review question was supported by clear inclusion criteria. Only one database was searched for published studies and it is possible that relevant studies were missed. The authors did not report whether this search was restricted by language, raising the possibility of language bias. Publication bias was assessed and no evidence of bias was found. Methods used to extract data are likely to have minimised the likelihood of reviewer error and bias but the authors did not report whether similar methods were used to select studies for inclusion in the review. The quality of the included studies did not appear to have been assessed. However, as acknowledged by the authors, the study quality was likely to be limited given the types of study designs included in the review. Methods used for the meta-analysis appeared appropriate but the results from a meta-analysis of observational studies may be at risk of confounding due to differences in study populations. The authors highlighted that historical bias was pervasive, as selection for stent-graft repair was typically based on availability of technique, and that the retrospective nature of the included studies led to comparisons between patients who survived to undergo repair rather than intention to treat. Overall, given some concerns about the review methods, the quality of the data and the risk of publication bias, the authors' conclusions may not be reliable.

Implications of the review for practice and research
Practice: The authors stated that the results supported endograft repair as first line therapy for blunt thoracic aortic trauma.

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

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