Systematic review of clinical outcomes in hybrid procedures for aortic arch dissections and other arch diseases

CRD summary
The authors concluded that hybrid repair of aortic arch disease indicated high risk of mortality compared with open repair but evidence was limited and there were no reliable long-term data. The nature of the evidence did not permit comparison of hybrid versus open repair. There was potential for review bias. The authors' cautions regarding the evidence seem appropriate.

Authors' objectives
To assess the effects of hybrid operative strategies for aortic arch repair on clinical outcomes.

Searching
MEDLINE was searched from 2002 to November 2011 for publications in English. Search terms were reported. Reference lists of retrieved articles and reviews were searched manually.

Study selection
Eligible studies included at least five patients who underwent combined open surgical and endovascular (hybrid) repair of aortic arch and reported on clinical outcomes.

Where reported, most patients were male and the mean age of patients ranged from 42 to 76 years. The primary outcomes were perioperative (30-day or in-hospital) neurologic complications (stroke and spinal cord ischaemia) and mortality. Studies included patients who underwent emergency and elective repair and included high risk patients (unfit for open surgery) and average risk patients. Aortic arches were classified into zones (0 to 4) according to their location (as defined in the review).

The authors did not state how many reviewers screened studies for inclusion.

Assessment of study quality
Study quality was assessed according to US Preventive Services Task Force recommendations.

The authors did not state how many reviewers assessed study quality.

Data extraction
Outcome incidences and ranges were extracted to calculate event rates or odds ratios and their 95% confidence intervals (CI).

The authors did not state how many reviewers extracted these data.

Methods of synthesis
Event rates or odds ratios (OR) and 95% CI were pooled in meta-analyses. The authors did not state which model was used to combine data.

Where data were clearly reported on patients undergoing aortic arch dissection, subgroup analysis in this population was performed. Subgroup analyses were performed by hybrid repair technique (arch debranching, frozen elephant trunk and stented elephant trunk with endovascular repair of thoracoabdominal aorta) and type of disease (acute/chronic type A and B aortic dissections). Separate analyses were performed to assess the effects of aortic arch zone (zone 0 versus zone 1), publication year (pre-2007 versus 2007 onward) and centre volume (≥20 versus <20) on the findings.

Results of the review
Fifty non-comparative studies (1,886 patients) were included in the review. Most studies were reported to be retrospective. No other quality issues were discussed.
**Mortality:** The pooled event ratio was 10.8% (95% CI 9.3% to 12.5%). Similar findings were reported by hybrid repair technique. Event rates were slightly higher when a stented elephant trunk technique was used (13.2%, 95% CI 7.8% to 21.4%; nine studies).

**Neurologic outcomes:** The pooled event ratio for stroke was 6.9% (95% CI 5.7% to 8.4%). Similar findings were reported for debranching and frozen elephant trunk techniques. Rates were higher for stented elephant trunk procedures (event ratio 10.9%, 95% CI 5.8% to 19.7%; eight studies).

The event ratio for perioperative spinal cord ischaemia was 6.8% (95% CI 5.6% to 8.2%). Slightly lower rates were reported in the debranching group and slightly higher rates were reported in frozen elephant trunk and stented elephant trunk groups.

**Dissections:** Similar event ratios were reported for all outcomes in patients who underwent all types of aortic dissection.

Analysis that compared zone 0 versus zone 1 showed a statistically significant higher risk of mortality in zone 0 (OR 2.8, 95% CI 1.17 to 6.7; 10 studies) but no differences for stroke and spinal cord ischaemia. Findings for other subgroup analyses were reported in the review.

**Authors’ conclusions**

Hybrid repair of aortic arch disease presented a persistent high risk of perioperative mortality compared with open repair. However, no reliable long-term data existed and conclusions were mainly provided from relatively small case series or retrospective studies. Further research was required.

**CRD commentary**

The review question and supporting criteria were broadly stated. The literature search was limited by language restrictions and the number of sources searched so potentially relevant data may have been missed. The authors stated that they assessed study quality but did not provide further details. The studies were non-comparative and mainly retrospective which suggested they were not of high quality. The authors did not state how many reviewers performed each stage of the review process so reviewer error and bias could not be ruled out.

Lots of studies were included but sample sizes were generally small. Few patient and study details were reported. The authors acknowledged certain limitations of the review including large heterogeneity in techniques, lack of standardisation in reporting patient outcomes and lack of long term results. It was unclear whether pooling of the results and the model used to pool data were appropriate.

The nature of the evidence did not permit assessment of the effectiveness of hybrid repair compared to other treatments and the findings should not be interpreted as such. It was unclear whether the review was poorly conducted or just poorly reported but there was still some potential for bias. The authors’ cautions regarding the evidence seem appropriate.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that further research was required to further improve the outcomes of aortic arch repair.

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**Bibliographic details**


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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.