

# Systematic review protocol: the frozen elephant trunk approach in aortic arch surgery

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**Background:** Surgical management of aortic arch pathologies still faces significant challenges, especially if the pathology involves the proximal descending aorta. A novel solution, named the frozen elephant trunk approach, encompasses a hybrid stent-graft that is placed during conventional arch surgery in the descending aorta to exert an expansive radial force. This obviates the need for second-stage surgery, while limiting the residual patency of the false lumen and minimizing wall stress. The objective of this systematic review is to assess the safety and efficacy of the frozen elephant trunk technique in aortic arch pathologies.

**Selection criteria:** We included all studies that used hybrid-stent grafts, or stented the proximal descending aorta under direct visualization during conventional arch surgery. Six electronic databases were searched (inception to June 2013), limited to studies that have reported 10 patients or more in the English language.

**Main results:** Sixteen observational studies, with 1,409 patients, were identified. A variety of commercial and custom-made stent-grafts were used, with varying pathology indications. Overall mortality was 8.5% (range, 0-18.2%). One-year survival, reported in six studies, was 85.6% (range, 70-97%), while five-year survival was 71.5% (range, 63-88%). Stroke and spinal cord injury was identified in 5.3% and 5.5% of patients respectively, while renal failure and reoperation for bleeding was 12.0% and 8.9% respectively. No other endpoints were sufficiently reported.

**Implications for clinical practice:** The frozen elephant trunk approach represents a reasonably safe procedure to repair the arch and proximal descending aorta. While promising, these results require long-term studies to assess durability and freedom from reoperation. Further regulatory approval is also required to permit widespread employment of specialized commercial hybrid stent-grafts.



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