

Comparative Outcomes of Minimally Invasive Aortic Valve Replacement Approaches: A Comprehensive Meta-Analysis

Maria Comanici , Halil I. Bulut , Shahzad G. Raja
Department of Cardiothoracic Surgery, Harefield Hospital, London, UK



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BACKGROUND

In the ever-evolving field of cardiac surgery, continuously evaluating the effectiveness of new techniques is imperative. This study focuses on **minimally invasive approaches to aortic valve replacement (AVR)**, particularly comparing **mini-sternotomy (MS)** and **mini-thoracotomy (MT)**.

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OBJECTIVE

To provide an **updated** and **comprehensive** evaluation of the outcomes associated with MS and MT approaches to AVR. By systematically analyzing data from multiple studies, we aim to offer insights into which approach might offer superior benefits in terms of key clinical outcomes.

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METHODS

Databases Searched

MEDLINE

EMBASE

OVID

Time Frame

1990 – 2024

Analysis Technique

Bayesian meta-analysis with random effects model

Primary outcomes

30-day mortality

1-year mortality

CPB time

ACC time

Hospital stay

Stroke incidence

ACC = aortic cross-clamp; CPB = cardiopulmonary bypass

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RESULTS



19 studies



31,800 patients

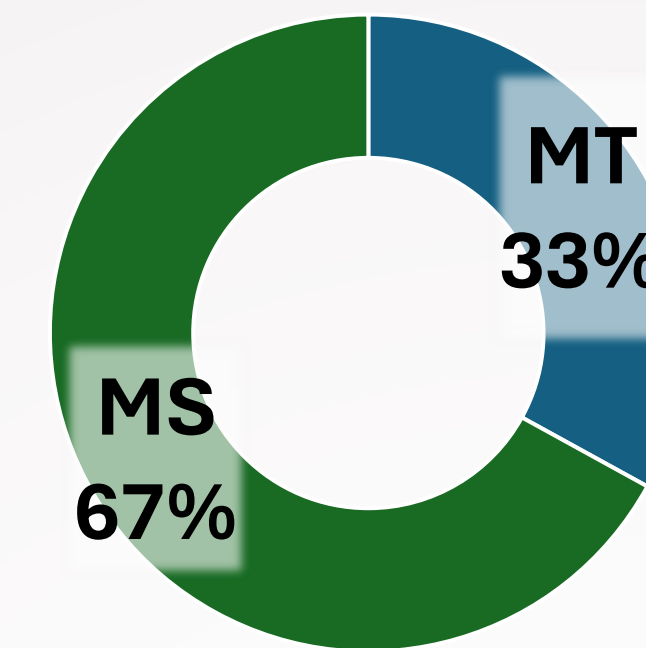
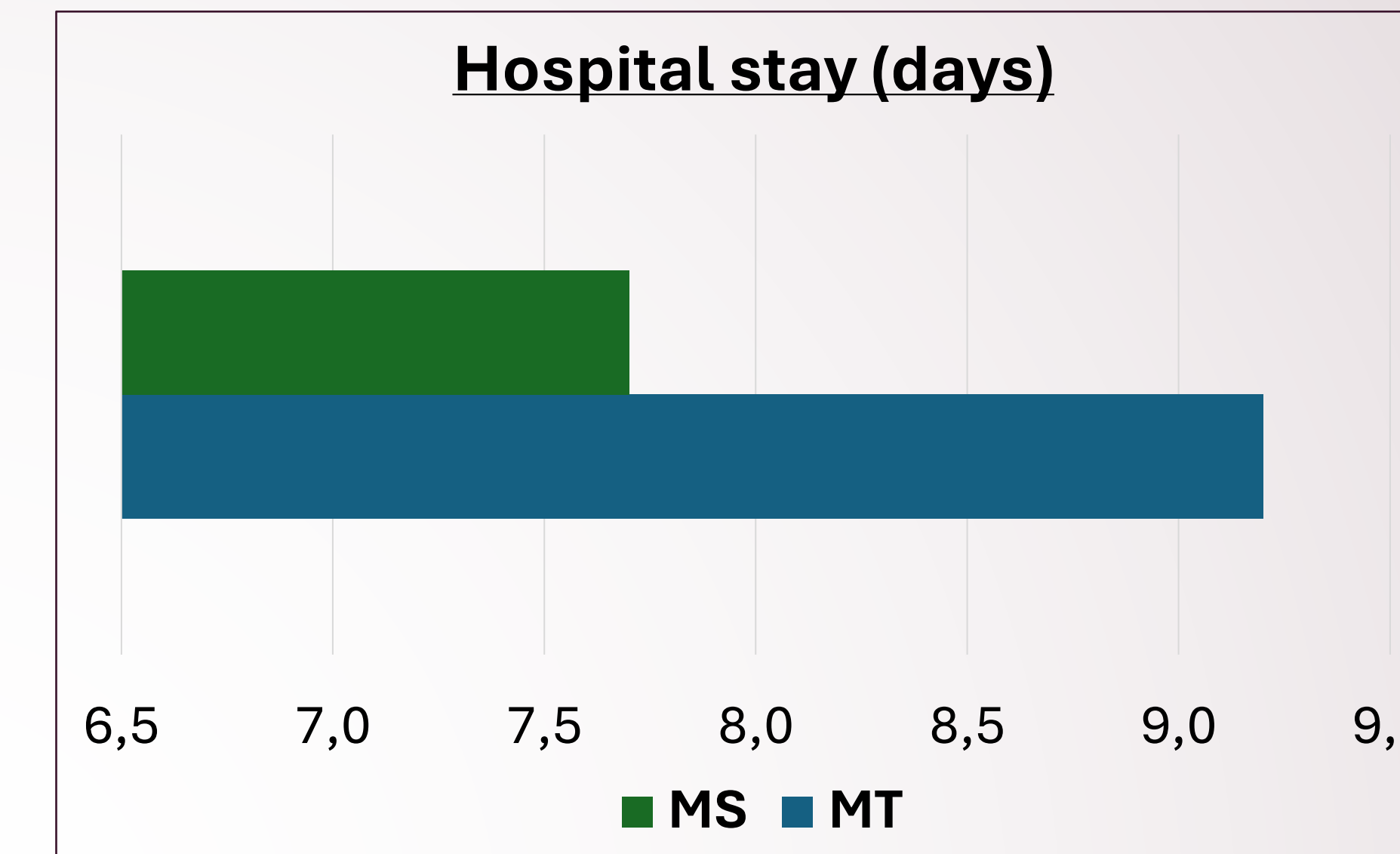
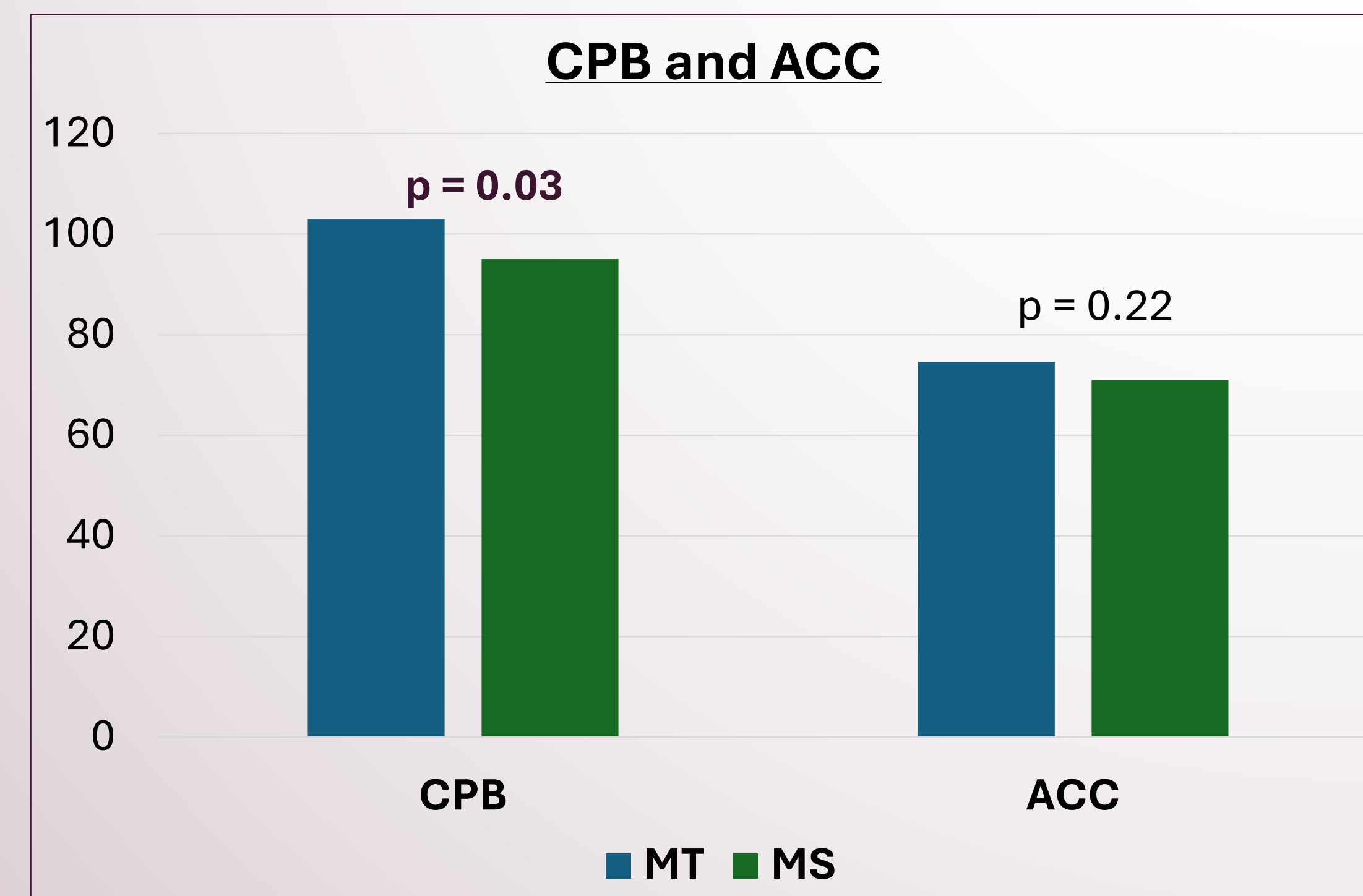


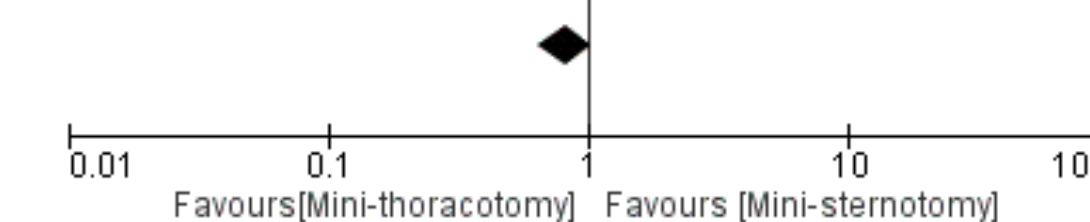
Table 1: Summary of Key Outcomes

Outcome	MS	MT	Significance
CPB Time	Lower	Higher	p = 0.03
ACC Time	Similar	Similar	p = 0.22
Hospital Stay	Similar	Similar	p = 0.56
Stroke Incidence	Similar	Similar	p = 0.08
30-day Mortality	Similar	Similar	p = 0.88
1-year Mortality	Similar	Similar	p = 0.62

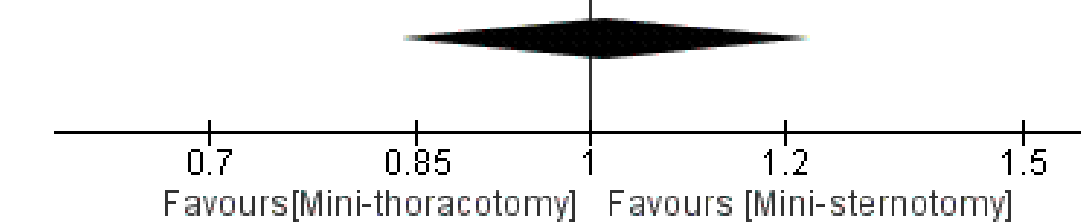
ACC = aortic cross-clamp; CPB = cardiopulmonary bypass; MS = mini-sternotomy; MT = mini-thoracotomy.



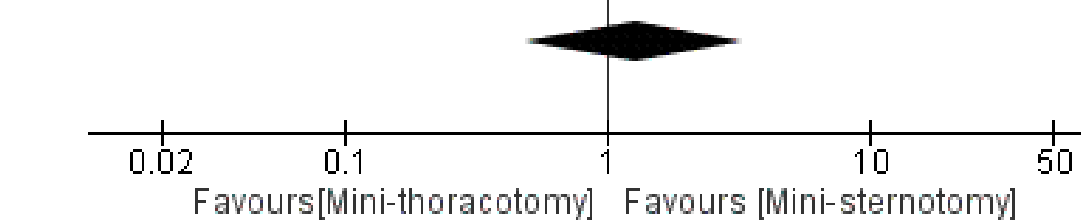
Stroke incidence
OR 0.81; 95% CI [0.64, 1.03]; p = 0.08



30-day mortality
OR 1.01; 95% CI [0.84, 1.23]; p = 0.88



1-year mortality
OR 1.27; 95% CI [0.49, 3.28]; p = 0.62



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DISCUSSION

Key Outcomes

- **Mortality Outcomes:** Comparable 30-day and 1-year mortality rates;
- **CPB and ACC Times:** MS significantly reduces CPB time, no significant difference in ACC time.
- **Hospital Stay and Stroke Incidence:** Similar hospital stay durations and stroke rates for both approaches.

Clinical Implications

- Both MT and MS are **viable**, minimally invasive options for AVR.
- **Mini-sternotomy** may be preferable for minimizing **CPB time**.
- Choice of technique should consider **surgeon expertise** and **patient-specific factors**.

Future Research

- **Long-term** outcomes and patient-reported outcomes need **further investigation**;
- **Cost-effectiveness** studies are necessary to provide comprehensive assessments;
- Randomized controlled trials comparing MT and MS could offer higher-quality evidence.

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CONCLUSION

- Both mini-thoracotomy and mini-sternotomy offer **comparable outcomes** in key clinical metrics.
- **Ministernotomy** has an advantage in **reducing cardiopulmonary bypass time**.
- Continuous evaluation and adaptation of surgical techniques are essential to enhance patient care in cardiac surgery.