Quality Of Life And Pulmonary Function After Minimally Invasive Aortic Valve Replacement Surgery (MIAVR): A Systematic Review

Hackney M, Vohra H

University of Bristol Medical School, Bristol Royal Infirmary & Bristol Heart Institute

Introduction

- Aortic valve replacement surgery via **midline sternotomy** (FS) is the standard surgical intervention used for aortic valve replacement, however, a **minimally invasive** (MI) approach is becoming more widely used (see **figures 1** & **2**)[1,2]
- **MI** approach provides a **better cosmetic result**, **less postoperative** and blood transfusion requirements, and **shorter hospital and ICU stays**, leading to **earlier mobilisation** and **quicker recovery**, overall potentially being **more cost-effective**[2,3].
- This review focuses on **quality of life** (QoL) and **pulmonary function** after MIAVR.
- There is a **dearth of evidence** surrounding QoL and pulmonary function **after MIAVR**. No systematic reviews or meta-analyses have been carried out regarding QoL or pulmonary function.
- QoL mainly assessed using Short Form 36 questionnaire (SF-36)
- Pulmonary function assessed using spirometry, giving FEV1, FVC and TLC values

Aims

- **Comprehensively analyse the current body of evidence** surrounding QoL and pulmonary function after MIAVR
- To **determine whether the minimally invasive technique is more beneficial to the patient** than the conventional FS approach, and if this should be standard practice going forward

Methods

- Thorough **literature search** conducted using PubMed database using relevant search terms
- Papers either **included or excluded based on their title**
- **Further articles were identified through cross reference check** from papers identified by the search

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Results – QoL

- Franke et al (2015): prospective study comparing 58 patients for FS with 78 patients for MI. Results of **SF-36 detected better physical parameters in MI group**[4]
- Walther et al (1999): prospective analysis of 338 patients, 120 received AVR. **No significant differences** in QoL identified between FS and MI group[5]
- Deter et al (2002): prospective analysis of 140 patients equally matched. 70 for FS 70 for MI. **No significant differences** between the groups were identified[6]
- Rodriguez-Cualo et al (2021): single-blind clinical trial of 100 patients. Results: **MI approach provides improved QoL and satisfaction with faster recovery at 1 month post-surgery** when compared with FS[7]
- Aliahmed et al (2018): 70 patients for MI, 70 for FS. 2 weeks post-surgery, more patients in MI group could cough, deeply breath, and walk for a short distance[8]

Results – Pulmonary function

- Kirmani et al (2017): systematic review of 7 trials with 511 patients. Pulmonary function was a secondary outcome measure. Results: **small increase in postoperative pulmonary function tests (PFTs) with MI when compared with FS**[9]
- Stolinski et al (2016): 65 patients for MI, 82 for FS. Results: **MI approach improved pulmonary function in elderly patients when compared with FS up to 1-month post-surgery**. At 3-months post-surgery there was **no longer a significant difference**[10]
- Moustafa et al (2007): randomised 60 patients, 30 for MI & 30 for FS. Results at 1-month post-surgery: **PFTs improved significantly in MI group** when compared with FS group[11]
- Bonacchi et al (2002): 40 patients for MI and 40 patients for FS. PFTs 5-days post-surgery: **significantly lower TLC in FS group**. **PFTs improved until 1-month post-surgery, particularly in MI** group. A significant statistical difference was observed between the groups[12]
- Stolinski et al (2017): 212 patients for MI and 212 for FS compared via spirometry assessment. **Pulmonary function less impaired in MI group**; there was a significant statistical difference between the two groups at 1-week post-surgery[13]
- Stolinski et al (2017): 201 patients for MI compared with 316 patients for FS. Spirometry 7-days post-surgery: **TLC and VC more improved in MI group** when compared with FS group[14]

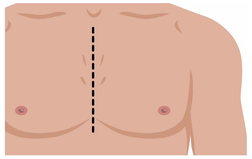


Figure 1. *Midline sternotomy*[1]

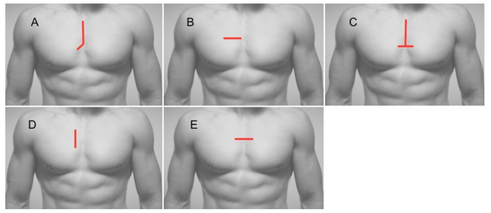


Figure 1. *Minimally invasive approaches for AVR*[2]

Limitations

- Most studies involved in this review are **single-centre** with **small sample sizes** so results may not be transferable or reliable when drawing conclusions
- PFT measurements **only analysed at certain postoperative time periods**
- Some studies used propensity score-matching but this **does not fully eliminate selection bias**
- **Variance in type of MI approach used**, results may differ between approaches

Conclusions

- **MIAVR is performed with comparable lung function and QoL** to conventional FS
- **QoL**: mostly no significant differences between MI and FS groups, showing **MIAVR is safe to perform and will not have a worse impact on the patient in terms of their QoL**
- **Pulmonary function**: **lung function less impaired after MIAVR** when compared with FS

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