Predictors of Second Clamp Time and Conversion to Median Sternotomy in Robotic Mitral Repairs

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Background

- There is lack of data to guide surgeons regarding high-risk patient and operative features for repeated clamp times in robotic surgery.
- This study sought to identify patient and operative characteristics associated with repeated clamp time in patients undergoing robotic mitral repair.

Methods

- Institutional registry with prospective clinical follow-up linked to state-wide, all-hospital admissions and vital statistics database was used to identify 1036 patients undergoing robotic mitral surgery between 2005-2020.
- Exclusion criteria: history of endocarditis, significant calcifications, mitral valve replacement, prior MitraClip, or those without prolapse.
- Primary outcome was freedom from repeated clamp time or conversion to median sternotomy.
- Secondary outcomes included ten-year survival and freedom from >2+ mitral regurgitation or reintervention with death as a competing risk.
- Predictors of second clamp time or conversion to median sternotomy were identified using multivariate logistic regression.

Results

Table 1.	One clamp time (N = 832)	Second Clamp time (N = 19)	P value
Operative Characteristics			
Posterior leaflet prolapse	**68.9% (573)**	**47.3% (9)**	**.046**
Anterior or bileaflet prolapse	**31.1% (259)**	**52.6% (10)**	**.046**
Operative Techniques			
Isolated resection with band	**68.0% (566)**	**26.3% (5)**	**.0003**
Chordal transfer	**7.3% (61)**	**21.1% (4)**	**.05**
Neochordae	**15.6% (130)**	**42.1% (8)**	**.006**
Commissural suture	**10.5% (87)**	**36.8% (7)**	**.0027**

Table 2. Techniques used	Patients requiring second clamp time (N = 19)
Replacement	**15.8% (3)**
Neochordae	**21.4% (4)**
Neochordae shortened or removed	**15.8% (3)**
Commissural suture	**21.0% (4)**
Other techniques or aortic repair	**26.3% (5)**

- The cohort consisted of 851 patients with degenerative mitral regurgitation (MR).
- Most patients underwent resection with band annuloplasty with a minority requiring additional techniques (Table 1).
- Second clamp times occurred in 19 patients: 15 for re-repair of >2+ MR, 3 for aortic regurgitation, and 1 for aortic dissection (Table 2). A third clamp time was required in 1 patient.
- There were 6 replacements in the cohort, with a repair rate of 99.3%.
- Conversion to median sternotomy was required in three patients: one for iatrogenic aortic dissection, one for right ventricle laceration, one for difficult visualization due to pectus.
- Freedom from >2+ MR or reintervention with death as a competing risk was 88.5% (95% Confidence Interval (CI) 82.6 – 93.1) at ten years follow-up.
- In multivariate logistic regression, presence of anterior or bileaflet prolapse was a predictor of second clamp time or conversion (Odds Ratio 2.8, 95% CI 1.1-6.8).

Limitations

- Small number of events limited a more complex statistical analysis.
- Referral bias may have played a role distributing mitral pathology most amenable to repair within this cohort.

Conclusion

- A near 100% repair rate may be achieved using a robotic approach, however, anterior or bileaflet prolapse increases risk for second clamp time which may have implications for patient selection early in the learning curve.

Disclosures

Dr. Trento reports research grant from Edwards Lifesciences. Dr. Emerson reports honoraria from Abiomed. Dr. Ramzy reports honoraria from Abiomed and LivaNova, consulting/travel from Abbott Laboratories and Medtronic Vascular Inc. Other authors deny disclosures.

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