70TH ESCVS CONGRESS & 7TH IMAD MEETING

20 I 23 JUNE 2022

Liège I Théâtre de Liège I Belgium

www.escvs2022.com

70th ESCVS
International congress of the European Society for Cardiovascular and Endovascular Surgery

7th IMAD meeting

70TH ESCVS CONGRESS & 7TH IMAD MEETING

20 I 23 JUNE 2022
Liège I Théâtre de Liège I Belgium
www.escvs2022.com

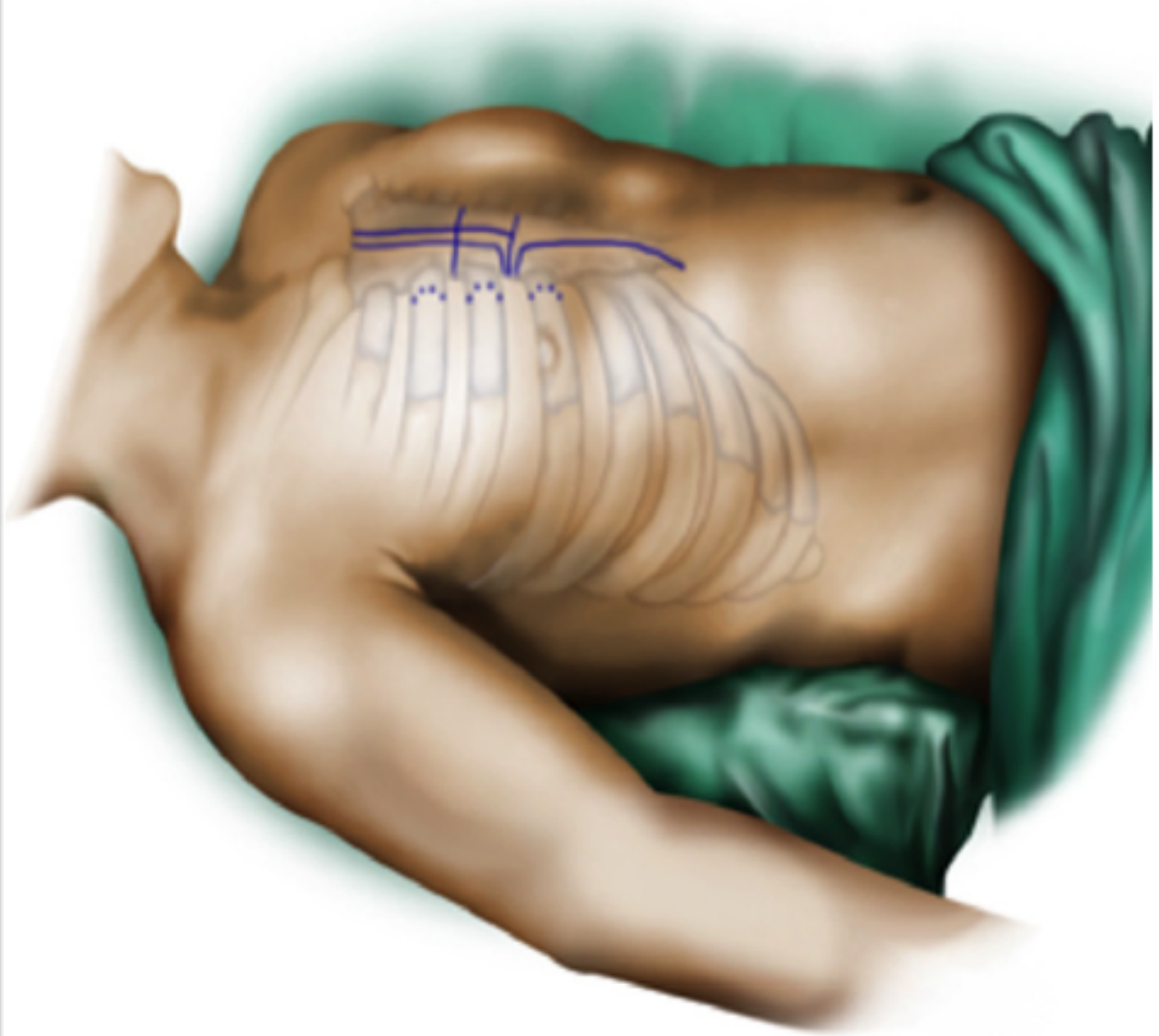
AVR goes mini: where is the evidence

Dr LAVIGNE Jean-Paul, Dr TCHANA-SATO Vincent

Department of cardiovascular surgery

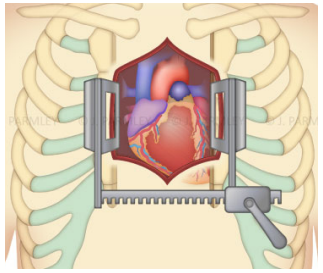
CHU LIEGE

No disclosure



Full median sternotomy (FMS)

- Large access to the heart
- Central CPB cannulation
- Combined surgery



Why minimally invasive surgery?

Prevent FMS complications

- Pulmonary dysfunction
- Sternal section
- Incisional pain
- Esthetic considerations
- Infection

Minithoracotomy vs ministernotomy for AVR

Minimally invasive aortic valve replacement using right minithoracotomy is associated with better outcomes than ministernotomy

Antonio Miceli, MD, PhD, Michele Murzi, MD, Danyiar Gilmanov, MD, Raffaele Fugà, MD, Matteo Ferrarini, MD, Marco Solinas, MD, and Mattia Glauber, MD

Objective: To compare the outcomes of right minithoracotomy (RT) versus ministernotomy (MS) in patients undergoing minimally invasive aortic valve replacement (AVR).

Methods: From January 2005 to December 2011, 406 patients underwent minimally invasive AVR, of whom 251 patients were in the RT group and 155 were in the MS group.

Results: The overall in-hospital mortality was 1.2% with no difference between the 2 groups (1.2% in RT vs 1.3% in MS). Patients undergoing minimally invasive AVR using RT had a lower incidence of postoperative atrial fibrillation (19.5% vs 34.2%, $P = .01$), shorter ventilation time (median, 7 vs 8 hours; interquartile range, 5-9 vs 6-12 hours, $P = .003$), intensive care unit stay (median 1 vs 1 day; interquartile range, 1-1 vs 1-2 days; $P = .001$), and hospital stay (median, 5 vs 6 days; interquartile range, 5-6 vs 5-8 days; $P = .0001$). No difference was found in terms of cardiopulmonary time, crossclamping time, postoperative stroke, re-exploration for bleeding, or blood transfusion.

Conclusions: Minimally invasive AVR using RT was associated with lower postoperative morbidities and a shorter hospital stay than MS. (J Thorac Cardiovasc Surg 2014;148:133-7)

Ministernotomy vs Minithoracotomy for AVR

Abstract

Background: While minimally invasive techniques for aortic valve replacement (AVR) have been shown to be safe, limited data exist comparing the varying approaches. This study aimed to compare the outcomes between two minimally invasive approaches for AVR: mini-sternotomy (MS) and right anterior thoracotomy (RAT).

Materials and Methods: A systematic search of MEDLINE, EMBASE, and OVID was conducted for the period 1990-2019. Nine observational studies (n = 2926 patients) met the inclusion criteria.

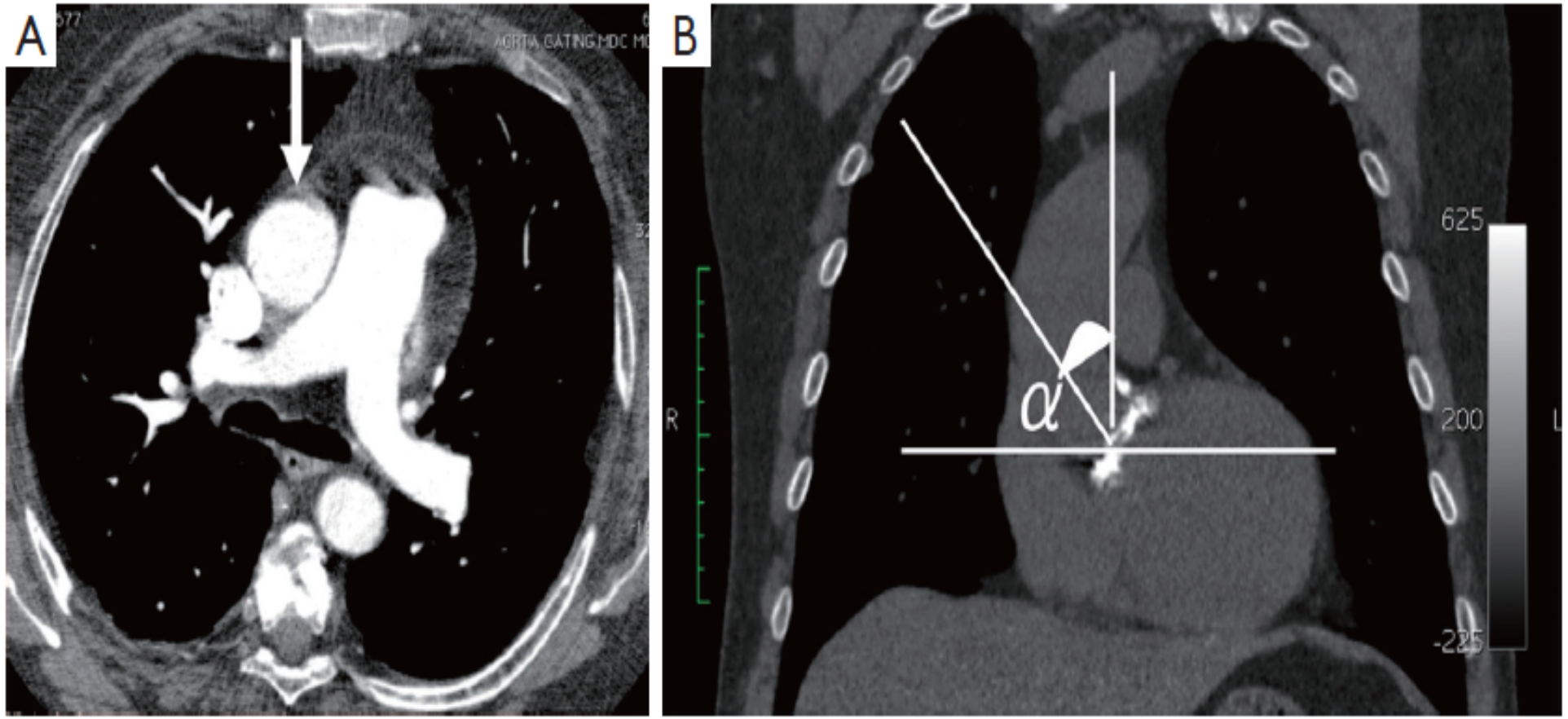
Results: T
ratio [OR
favored I
P < .001),
CI: −0.20
95% CI:
proached
P = .097).
were sim
RAT (SM
ventilation was borderline significant in favor of RAT (SMD: 0.18, 95% CI: −0.027 to 0.34; *P* = .095).

Conclusions: This study highlights important differences in short-term outcomes between MS and RAT as approaches for AVR. This has important implications for patient selection, especially in the elderly, where such approaches are becoming more common-place.

Yousuf et al. JCS 2020

Difficult to draw any definitive conclusion and only a prospective randomized trial can achieve that goal

Anatomical considerations for RAMT



Van Praet KM. JCS 2020; 35:2341-2346 and Glauber et al. ACS 2015; (1):26-32

70TH ESCVS CONGRESS & 7TH IMAD MEETING

20 I 23 JUNE 2022

Liege I Théâtre de Liège I Belgium

www.escvs2022.com

Right anterior minithoracotomy for aortic valve replacement: 10-year experience of a single center

Mattia Glauber, MD, Daniyar Gilmanov, MD, Pier Andrea Farneti, MD, Enkel Kallushi, MD, Antonio Miceli, MD, Francesca Chiaramonti, MD, Michele Murzi, MD, and Marco Solinas, MD

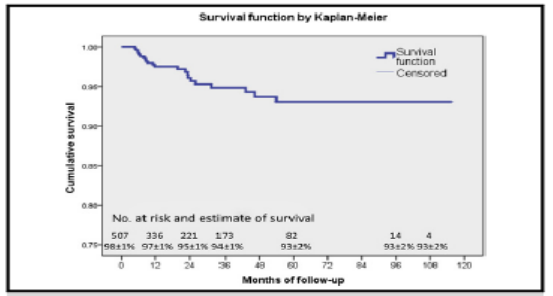
ABSTRACT

Objective: Minimally invasive aortic valve replacement (AVR) has been associated with several better outcomes over the standard full sternotomy approach. We revised our 10-year experience with right anterior minithoracotomy (RAMT) for AVR.

Methods: Between 2004 and 2014, a total of 593 patients (310 men; median age: 73.8 years) underwent AVR via RAMT. Preoperatively, a mixed valve lesion was diagnosed in 55 (9.3%) patients; and pure aortic regurgitation in 86 (14.5%). Mean logistic EuroSCORE I (European system for cardiac operative risk evaluation) was 7.4 (median: 5.76).

Results: In 302 (50.9%) patients, a sutureless or rapidly implantable biological prosthesis was used; in 23 (3.9%), a mechanical prosthesis; and in the remainder, a conventional biological prosthesis. A total of 113 (19.1%) patients had a small aortic annulus (≤21 mm). Operative times averaged 80 (median: 74) minutes of crossclamping time, and 117 (107) minutes of perfusion time; these were significantly shorter with a sutureless prostheses, compared with a sutured prostheses: perfusion 99 versus 134 minutes, $P < .0005$; aortic crossclamping time: 64 versus 97 minutes, $P < .0005$. The mean (median) assisted ventilation time was 9.8 (6) hours; intensive care unit stay was 1.5 (1) days; hospital length of stay was 6.6 (6) days. Overall in-hospital mortality was 9 deaths (1.5%). At 31.5 months mean follow-up time (1531 cumulative patient-years), 94.8% survival was observed.

Conclusions: Minimally invasive AVR is a safe procedure, with low perioperative morbidity, and low rates of reoperation and death at late follow-up. Excellent outcomes can be achieved with minimally invasive AVR via right anterior minithoracotomy. Sutureless prostheses facilitate minimally invasive AVR and are associated with reduced operative times. (J Thorac Cardiovasc Surg 2015;150:548-56)



Overall survival curve by Kaplan-Meier test for general cohort (593 patients).

Central Message

Aortic valve replacement through right anterior minithoracotomy provides excellent outcomes. Sutureless prostheses facilitate mini aortic valve replacement.

Perspective

Many patients with aortic valve disease still undergo conventional AVR or are directed to alternative treatment with transcatheter AVR. Mini-AVR, through RAMT, provides excellent short-term outcomes, with low mortality and perioperative morbidity, and comparable long-term survival. More surgeons should enrich their armamentarium by adding RAMT AVR. Sutureless prostheses can increase adoption of RAMT AVR.

Table 2 Results in patients underwent AVR with conventional sutured valves

Variables	Glauber *et al.*, (*J Thorac Cardiovasc Surg* 2013;145:1222-6) (26)	Bowdish *et al.*, (*Eur J Cardiothorac Surg* 2016;49:456-63) (24)	Nguyen *et al.*, [*Innovations* (*Phila*) 2017;12:33-40] (27)	Welp *et al.*, (Interact *Cardiovasc Thorac Surg* 2018;27:481-6) (25)	Olds *et al.*, (*J Cardiothorac Surg* 2019;14:91-8) (42)
Study type	Retrospective, propensity match study	Retrospective, propensity match study	Retrospective propensity match study patients with reduced ejection fraction	Retrospective review, obese patients (BMI >30 kg/m^2)	Retrospective study
Patients groups	RAT (n=192) *vs.* full sternotomy (n=336) post-match 138 *vs.* 138	RAT (n=294) *vs.* full sternotomy (n=198) outcomes adjusted on PSM quintiles	EF <40%: FS (n=120) *vs.* MIAVR (n=58); post-match EF <40% 35 *vs.* 35; EF ≥40%: FS (n=695) *vs.* MIAVR (n=635); post-match EF ≥40% 377 *vs.* 377	FS (n=91) *vs.* upper MS (n=126)	RAT (n=267) *vs.* MS (n=120) *vs.* FS (n=116)
Key results	Mortality 0.7% *vs.* 0.7% (P=1.000); postoperative AF 18.1% *vs.* 27.9% (P=0.030); transfusions 18.8% *vs.* 34.1% (P=0.004); ventilation time (minutes) 6 [5–9] *vs.* 8 [6–11] (P=0.006)	Mortality 0.63 (0.14, 2.97) (P=0.560); wound infections 0.15 (0.04, 0.57) (P=0.005); transfusions 0.61 (0.41, 0.90) (P=0.013); ICU stay −0.07 (−0.13, −0.01) (P=0.016); in-hospital stay −0.07 (−0.12, −0.02) (P=0.011)	ICU stay MIAVR =56.8±82.2 *vs.* SAVR =84.6±138.7, P<0.001; bleeding MIAVR =0.8% *vs.* SAVR =3.2%, P=0.040; postoperative atrial fibrillation MIAVR =18.8% *vs.* SAVR =38.7%, P<0.001; length of stay (days) MIAVR =7.1±5.3 *vs.* SAVR =7.9±5.6 days, P=0.040	Reintubation rate 7.7% *vs.* 0% (P=0.002); tracheotomy 4.4% *vs.* 0.0% (P=0.030); no transfusion 44.4% *vs.* 63.5% (P=0.004); ICU stay (days) 4 [1–35] *vs.* 2 [1–25] (P=0.031)	CPB time (min), median (IQR) 82 [67–113], 117 [94–140], 103 [86–133] P=0.001; aortic X-clamp (min), median (IQR) 58 [48–85], 91 [69–108], 71 [57–100] (P=0.001); ICU LOS (hours), median (IQR) 22 [17–31], 25 [18–49], 31 [22–68] (P<0.050); prolonged vent time, n (%): 10 (3.8) 11 (9.2) 15 (12.9) (P<0.010)
Comments	RAT is associated to lower rate of postoperative complications, ventilation time and length in hospital stay	RAT has similar morbidity and mortality rates to sternotomy with lower blood product use and ICU and hospital stay	MIAVR is associated to improved short term outcome compared to FS in patient with preserved EF, in patients with reduced EF outcomes are comparable	Significant benefits in terms of decreased transfusion requirements, ventilator times and ICU times were found in the mini-AVR group	The mini-thoracotomy approach showed decreased operative times, decreased lengths of stay, decreased incidence of prolonged ventilator time

Di Bacco; JTD 2021

70TH ESCVS CONGRESS & 7TH IMAD MEETING

20 I 23 JUNE 2022
Liege I Théâtre de Liège I Belgium
www.escvs2022.com

Current Surgical Risk Scores Overestimate Risk in Minimally Invasive Aortic Valve Replacement

Abstract

Objective: Risk-scoring systems for surgical aortic valve replacement (AVR) were largely derived from sternotomy cases. We evaluated the accuracy of current risk scores in predicting outcomes after minimally invasive AVR (mini-AVR). Because transcatheter AVR (TAVR) is being considered for use in low-risk patients with aortic stenosis, accurate mini-AVR risk assessment is necessary. **Methods:** We reviewed 1,018 consecutive isolated mini-AVR cases (2009 to 2015). After excluding patients with Society of Thoracic Surgeons Predicted Risk of Mortality (STS-PROM) scores ≥4, we calculated each patient's European System for Cardiac Operative Risk Evaluation (EuroSCORE) II, TAVR Risk Score (TAVR-RS), and age, creatinine, and ejection fraction score (ACEF). We compared all 4 scores' accuracy in predicting mini-AVR 30-day mortality by computing each score's observed-to-expected mortality ratio (O:E). Area under the receiver operating characteristic (ROC) curves tested discrimination, and the Hosmer–Lemeshow goodness-of-fit tested calibration. **Results:** Among 941 patients (mean age, 72 ± 12 years), 6 deaths occurred within 30 days (actual mortality rate, 0.6%). All 4 scoring systems overpredicted expected mortality after mini-AVR: ACEF (1.4%), EuroSCORE II (1.9%), STS-PROM (2.0%), and TAVR-RS (2.1%). STS-PROM best estimated risk for patients with STS-PROM scores 0 to <1 (0.6 O:E), ACEF for patients with STS-PROM scores 2 to <3 (0.6 O:E), and TAVR-RS for patients with STS-PROM scores 3 to <4 (0.7 O:E). ROC curves showed only fair discrimination and calibration across all risk scores. **Conclusions:** In low-risk patients who underwent mini-AVR, current surgical scoring systems overpredicted mortality 2-to-3-fold. Alternative dedicated scoring systems for mini-AVR are needed for more accurate outcomes assessment.

Central Message

Current surgical risk scores for aortic valve replacement (AVR) were largely derived from sternotomy AVR cases. When applied to minimally invasive AVR, these risk scores consistently overestimate mortality risk. Dedicated scoring systems should be developed to properly inform patients of minimally invasive AVR risks.

Alnajar ahmed;
Innovations 2021

Results…

COMPARED TO FMS, MINIMALLY INVASIVE AVR SURGERY OFFERS SEVERAL ADVANTAGES:

- Similar survival
- Less pain
- Better postoperative respiratory function
- Reduced mechanical ventilation
- Less bleeding, less blood transfusion
- Reduced ICU and Hospital LOS
- Faster recovery

But… Prolonged CPB and Aortic cross clamp times! At least at the beginning of the learning curve

What about sutureless valves ?

70TH ESCVS CONGRESS & 7TH IMAD MEETING

20 I 23 JUNE 2022

Liege I Théâtre de Liège I Belgium

www.escvs2022.com

Right anterior mini-thoracotomy and sutureless valves: the perfect marriage

Background: A minimally invasive approach (MIA) reduces mortality and morbidity in patients referred for aortic valve replacement (AVR). Sutureless technology facilitates a MIA. We describe our experience with the sutureless Perceval (LivaNova, Italy) aortic bioprosthesis through a right anterior mini-thoracotomy (RAMT) approach.

Methods: Between March 2011 and October 2019, 1,049 patients underwent AVR with Perceval bioprosthesis. Five hundred and three patients (48%) were operated through a RAMT approach in the second intercostal space. Considering only isolated AVR (881), 98% of patients were operated with MIA, and Perceval in RAMT approach was performed in 57% of these patients. Eight patients (1.6%) had previously undergone cardiac surgery. The prosthesis sizes implanted were: S (n=91), M (n=154), L (n=218) and XL (n=40). Concomitant procedures were mitral valve surgery (n=6), tricuspid valve repair (n=1), mitral valve repair and tricuspid valve repair (n=1) and [illegible]. Mean age was 78±4 years (range, 65–89 years), 317 patients were female (63%) and EuroSCORE II was 5.9%±8.4%.

Results: The 30-day mortality was [illegible]. Cardiopulmonary bypass (CPB) and aortic cross-clamp times were 81.6±30.8 and 50.3±24.5 minutes respectively for stand-alone procedures. In two patients, early moderate paravalvular leakage appeared as a result of incomplete expansion of the sutureless valve due to oversizing of the bioprosthesis, requiring reoperations at two and nine postoperative days with sutured aortic bioprosthesis implantation. Permanent pacemaker implantation within the first thirty days was necessary in 26 (5.2%) patients. At the mean follow-up of 4.6 years (range, 1 month to 8.6 years), survival was 96%, freedom from reoperation was 99.2%, and mean transvalvular pressure gradient was 11.9±4.3 mmHg.

Conclusions: AVR with the Perceval bioprosthesis in a RAMT approach is a safe and feasible procedure associated with low mortality and excellent hemodynamic performance. Sutureless technology facilitates a RAMT approach.

Solinas et al.; ACS 2020

70TH ESCVS CONGRESS & 7TH IMAD MEETING

20 I 23 JUNE 2022

Liege I Théâtre de Liège I Belgium

www.escvs2022.com

Minimally invasive AVR with sutureless bioprosthesis through right minithoracotomy with completely central cannulation – Early results in 203 patients

Abstract

Objectives: Minimally invasive aortic valve replacement (mini-AVR) might improve clinical outcomes, particularly in high-risk and elderly patients. Sutureless/rapid deployment bioprosthesis can offer advantage of decreasing the cross-clamp time (XCT) and easing the procedure. Our aim was to evaluate the safety and perioperative outcomes of mini-AVR using sutureless bioprothesis via the right minithoracotomy approach with our modified technique of central cannulation.

Methods: We performed a single-center retrospective analysis of 203 patients consecutively undergoing isolated AVR between March 2016 and June 2018 with the right minithoracotomy approach and our modified technique of central cannulation. Aortic valve diseases were stenosis (89.9%), regurgitation (1.6%), and mixed valve disease (8.5%). Patients with concomitant procedures were excluded. Primary endpoints were 30-day and 4-month mortality.

Results Mean age was 76 ± 6.2 years, 63 (31%) patients were 80 years or older. Cardiopulmonary bypass and XCT were 60.5 (39–153) and 35 (24–76) min, respectively. Thirty-day and 4-month mortality were 1% (two patients). We have observed minor paravalvular leak (PVL) which occurred in seven patients (3.4%), and no moderate/severe PVL was found perioperatively. One patient developed moderate/severe PVL during the 4-month follow-up. There was no structural valve degeneration. Two (1%) patients needed conversion to full sternotomy, and two

Conclusions: Mini-AVR via the right minithoracotomy approach with central cannulation is an effective and safe procedure and demonstrates excellent early clinical outcomes. This approach can be particularly valuable in higher risk and elderly patients.

Davorin sef; JCS 2020

Conclusions

- Mini-AVR through RAMT is a safe and feasible procedure with excellent results
- The operative mortality and long-term survival of Mini-AVR is comparable to FMS
- Mini-AVR offers several advantages beyond esthetics considerations

Conclusions

- Limited diffusion of the technique compared with FMS
  - Lack of a prospective randomized trial comparing various approaches
  - Steep learning curve (RAMT vs mini-sternotomy)
  - Complications related to peripheral cannulation
  - Cost of the procedure (vs reduced morbidity and LOS)

- Despite the steep learning curve, surgeons should adopt this technique and propose it to their patients (patient selection!)

« If Cardiac surgeon cannot do MICS in the next 5 years they'll be out of business »

JT McGinn Jr., MD,
Chief of cardiac surgery at Miami Cardiac and Vascular Institute.

Thank you for your attention

CCV&T Chirurgie Cardiaque, Vasculaire & Thoracique | CHU de Liège

http://www.ccvt-chu.be

ACCUEIL | INFO PATIENT ET FAMILLE | EQUIPE | DOMAINE D'EXPERTISE | RECHERCHES ET ENSEIGNEMENT | +

RENDEZ-VOUS / CONTACT

ACCUEIL