

# The Minithoracotomy Approach: A Safe and Effective Alternative for Heart Valve Surgery

Giovanni Mariscalco, MD, PhD, and Francesco Musumeci, MD

Department of Heart and Vessels, Cardiac Surgery Unit, Varese University Hospital, Varese; and Department of Cardiac Surgery and Transplantation, S. Camillo Hospital, Rome, Italy

Despite criticisms over the last decade, heart valve surgery through right anterior minithoracotomy (MT) proved excellent short-term and long-term-term results, becoming a feasible and popular alternative to the sternotomy approach. The rapid development and refinements of techniques have led to MT valve surgery being considered safe, effective, and durable. Minithoracotomy has been demonstrated to be a valid cost-effective and cost-saving strategy

for valve surgery, being associated with reduced morbidity and mortality. Tangible benefits include less pain, faster postoperative recovery, and better cosmetic results. As a result, MT has been increasingly used as a routine approach in many centers for both aortic and mitral valve surgery.

(*Ann Thorac Surg* 2014;97:356–64)

© 2014 by The Society of Thoracic Surgeons

With the advent of cardiopulmonary bypass (CPB) in 1954, complex surgical valve procedures became available, with a progressive improvement in experience with various prosthetic devices [1]. Although the first valvular approach through right thoracotomy under CPB was reported by Lillehei and colleagues [2] in 1957, valve surgery through full sternotomy (ST) became subsequently popular, because of the complete exposure of the heart, the adequate myocardial protection, and the reduced operative time. That conventional approach proved to have outstanding outcomes and long-term success in both aortic and mitral valve (MV) surgery [3–6]. During the past 10 years, however, minimally invasive valve surgery gained popularity minimizing patient trauma, improving recovery, and reducing hospital expenditures (Fig 1) [3–23]. Alternative approaches to conventional ST include partial sternotomy and minithoracotomy (MT) [3–5]. Mitral and aortic valve procedures through right MT have been proved to be safe and efficient options with excellent early and late outcomes [6–23]. Based on these results, the consensus statement of the International Society of Minimally Invasive Coronary Surgery (ISMICS) has recently defined MV surgery through MT as an alternative to conventional ST [24]. Therefore, MT has now reached recognition worldwide, becoming widely adopted for both MV and aortic valve (AV) surgery.

## Material and Methods

A systematic search was performed using the PubMed database to identify all studies reporting results and outcomes of MT heart valve surgery. Search strategy combined “mitral valve,” “aortic valve,” “tricuspid

valve,” “minimally invasive,” and “minithoracotomy.” Published original articles, case series, and individual reports were analyzed. All studies were identified from the existing literature until April 2013. In addition, the “related articles” function in PubMed was used as a further check of rigor. When multiple studies had been published by a single institution, the largest, most recent, or most informative study was considered.

## Historical and Technical Notes

In 1996, Carpentier and colleagues [25] performed the first video-assisted MV repair through a right anterolateral MT using peripheral extracorporeal circulation with ventricular fibrillation. A video-assisted controlled by a voice-activated camera arm and by robotic telemanipulation and three-dimensional endoscopy was subsequently introduced [26–30]. In the same years, feasibility and myocardial functional preservation were reached through right MT with the port-access technique [28]. In 1998 Carpentier’s group performed the first completely robotic MV repair [32].

A variety of surgical approaches and techniques for MV surgery through right MT have been proposed. A dual-lumen endotracheal tube or bronchial blocker are generally required [6–16, 26–34]. The entire procedures are performed through a 4 cm to 7 cm port located in the right inframammary groove, usually in the fourth intercostal space [6–16, 26–34]. Arterial cannulation is accomplished with femoral artery or direct aortic cannulation, whereas venous drainage requires femoral vein with or without concomitant internal jugular cannulation, generally under transesophageal echocardiography guidance. Aortic occlusion is performed by either percutaneous endovascular intraluminal balloon (the port-access system) or transthoracic aortic clamp, inserted through a separate transthoracic incision [6–16, 26–34]. The majority of procedures utilize antegrade delivery of cardioplegia into the aortic root, administered through

Address correspondence to Dr Mariscalco, Department of Heart and Vessels, Cardiac Surgery Unit, Varese University Hospital, Via Guicciardini 7, Varese 21100, Italy; e-mail: [giovannimariscalco@yahoo.it](mailto:giovannimariscalco@yahoo.it).

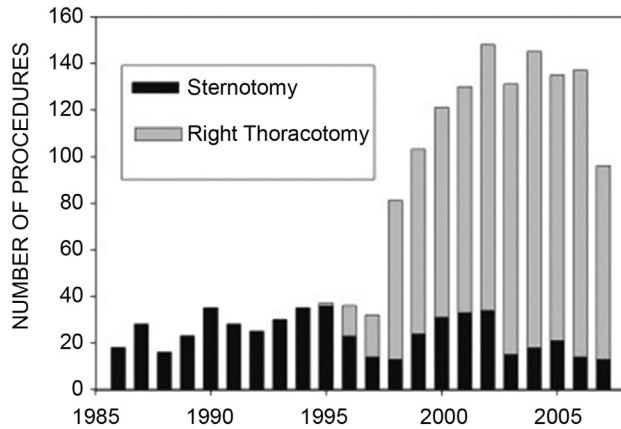


Fig 1. Distribution of surgical approach—sternotomy (black bars) or right thoracotomy (gray bars)—for degenerative mitral valve repair by year of operation. (Reprinted from Galloway et al [7], with permission from Elsevier.)

the balloon endovascular clamp or the direct aortic root cannulation [10–20, 29–37].

In 1997, Benetti and coworkers [35] proposed the right anterior MT approach also for AV. A transverse incision of 5 cm to 7 cm is generally placed over the second or the third intercostal space [18–24]. Central cannulation involving ascending aorta and right atrium or a femoral cannulation is required [18–24]. A direct cross clamping of the aorta with antegrade cardioplegia delivery is usually employed. Left ventricular venting is accomplished as in other conventional AV operations. In 1999, Robin and associates [36] performed the first video-assisted tricuspid valve surgery.

## Results

Despite criticisms over the last decade, various institutions have proved excellent results for MT valve surgery [6–26].

### Hospital Mortality

Patients undergoing MV and AV surgery through right MT have 0% to 10% hospital mortality, although recent series testify to lower rates ranging from 0% to 2.2% along with the modification and simplification of surgical techniques [6–26]. None of the largest series documented differences in hospital mortality between the MT and ST approaches (Tables 1 and 2).

Chitwood and associates [27] firstly suggested that video-assisted mitral operations can be performed safely as compared with the conventional ones. Their first experience enrolled 31 consecutive patients undergoing MT mitral valve surgery (repair and replacement) compared with 100 patients having conventional ST [27]. No hospital deaths were documented in the MT group, and 30-day mortality was comparable between groups (3.2% versus 2.2%,  $p =$  nonsignificant). Recent series report even better results [6–16]. Galloway and associates [7] enrolled 1601 patients affected by degenerative MV

disease. The MV repair was performed in 1,071 patients with right anterior MT and in 530 with the ST approach, and hospital mortality was identical (1.3% versus 1.3%). Iribarne and associates [16] provided similar results with 1,121 isolated MV operations. After propensity matching analysis, 382 pairs were obtained: no differences in 30-day mortality were observed between the two groups (1.8% versus 1.8%,  $p = 0.622$ ) [16].

Consonant results are reported for AV surgery [17–23]. Glower and associates [19] collected more than 300 AV undergoing MT, documenting a hospital mortality of 1.3%. Glauber and associates [23] enrolled data from 637 consecutive patients undergoing isolated AV surgery: 138 MT patients were propensity matched to those undergoing ST, and equal inhospital mortality was registered [9]. Excellent results are also reached in reoperative valve surgery conducted through MT [37–40].

### Neurologic Events

Similarly to other minimally invasive valve surgery approaches, concerns have arisen for MT with reference to possible postoperative cerebrovascular accidents (CVA). The reduced surgical field with its theoretically inadequate deairing was advocated as the main cause for possible negative neurologic outcomes. Although early series seem to suggest an increased CVA rate, the use of transesophageal echocardiography and continuous CO<sub>2</sub> insufflation have recently allowed the achievement of comparable outcomes [41]. Iribarne and associates [16] registered no differences in early stroke (0.3% versus 1.3%,  $p = 0.217$ ) and delayed stroke (0.8% versus 1.3%,  $p = 0.725$ ) after MV surgery. Dogan and associates [42] randomly allocated 40 consecutive patients affected by severe MV disease to undergo right anterior MT or ST. Neuropsychological tests were performed a day before and 5 days and 2 months after the operation, and failed to demonstrate significant differences between the two approaches. No CVA differences were also observed for elderly patients and for AV surgery [17–23, 43–46]. Interestingly, comparison of endoaortic balloon occlusion (EABO) and transthoracic clamping revealed controversial results [7, 8, 47]. Modi and colleagues [8] observed a trend toward an increased risk of stroke in the EABO group (2.7% versus 1.2%,  $p = 0.08$ ), whereas other studies did not, although more microembolic events were detected in the same group [6, 47].

The atherosclerotic burden in aortic arch and descending aorta seems to play a crucial role in postoperative CVA, especially in elderly patients, using retrograde perfusion [48]. Several studies analyzing MT valve surgery identified retrograde perfusion as the only independent risk factor for stroke (odds ratio 8.5;  $p = 0.04$ ), suggesting that retrograde perfusion is a viable option for younger patients without vascular disease only [10, 12, 48, 49].

### Reexploration and Transfusions

Since the first MT experiences, a potential reduction in transfusions, bleeding, and reexplorations was expected. However, both observational and randomized studies

Download English Version:

<https://daneshyari.com/en/article/2873483>

Download Persian Version:

<https://daneshyari.com/article/2873483>

[Daneshyari.com](https://daneshyari.com)