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Original article

Tricuspid valve repair by DeVega technique versus ring annuloplasty in patients with functional severe tricuspid regurge

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Abstract

Background: Repairing the tricuspid valve in patients undergoing left heart valve surgery is still controversial. Severe Tricuspid regurge is repaired by most surgeons, while moderate regurge is frequently unaddressed. Another controversy is the technique of repair. DeVega technique is widely used; still, the longevity of this repair is still questioned. The risk of its early failure and subsequent recurrence of significant regurge requiring redo surgery has led many surgeons to adopt the use of annuloplasty rings. The aim of our study was to assess the short term results (1 year) of tricuspid repair with or without ring annuloplasty.

Patients and methods: 80 patients who had tricuspid repair concomitantly with mitral valve surgery at Cairo University Hospitals over 5 years were studied by echocardiography at discharge and at 1 year after surgery.

Results: 62 patients had repair using the DeVega annuloplasty (group A) while 18 had ring annuloplasty (group B). The mean age was 33 ± 6 years and 37 ± 8 years for group A and B respectively. The cardiopulmonary bypass (CPB) time was relatively longer in group B. There was only one mortality in group A. Echocardiography done for all patients of both groups at discharge and at 1 year postoperatively showed no significant difference between both groups.

Conclusion: Tricuspid repair using ring annuloplasty has good results but with no significant benefits over DeVega annuloplasty at one year.

Keywords: Valvular heart disease; Tricuspid repair; DeVega; Tricuspid annuloplasty rings

1. Introduction

Repairing the tricuspid valve in patients undergoing left side valve surgery (mitral or aortic) is still controversial. Most surgeons perform tricuspid repair only for severe tricuspid regurge. Moderate Tricuspid regurge, often secondary to annular dilatation following right ventricular enlargement due to left side pathology is not attacked by most

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surgeons. These unrepaired valves, can however progress to severe Tricuspid regurge, causing severe symptoms and impairing the right ventricular (RV) function by time. These patients are usually managed by diuresis and only considered for Tricuspid valve replacement after advanced RV dysfunction has developed. By that time, Tricuspid valve surgery carries very high risk of morbidity and mortality [1].

The American College Of Cardiology/American Heart Association (ACC/AHA) as well as the European Society Of Cardiology (ESC) have agreed on performing Tricuspid repair for severe Tricuspid regurge in patients who are undergoing mitral valve surgery as a class one indication [2,3].

Another controversy is the technique of repair. The well-known DeVega procedure (single poly propylene suture from the anteroseptal to the posteroseptal commissure with a pledget at each end) or a modified DeVega (pledget placement between each entry site into the annulus), is widely used with accepted results by many surgeons. It is a simple and moreover economic procedure. The longevity of the outcome of this technique highly questioned the risk off its failure with subsequent development of significant tricuspid regurgitation requiring a redo surgery. This has led many surgeons to adopt the use of annuloplasty rings.

The aim of our study was to assess the short term results (one year) of tricuspid repair with or without ring annuloplasty.

2. Patients and methods

We studied the outcome of 80 patients who had concomitant tricuspid valve repair for severe tricuspid regurgitation with mitral valve surgery at Cairo University Hospitals from 2010 to 2015. This retrospective study was performed including all patients who underwent this procedure during this period of time. Patients with concomitant aortic pathology, ischemic heart disease needing coronary artery bypass grafting (CABG) and redo cases were excluded. The studied patients were divided into two groups: Group (A) included 62 patients who had tricuspid repair using the DeVega technique, while group (B) included 18 patients who had ring annuloplasty.

2.1. Preoperative data

The following table (Table 1), represents the preoperative criteria for both groups.

Table 1
Preoperative data.

	Group A	Group B	P value
Number of patients	62	18	
Females	63%	68%	>0.05 (NS)
Mean age	33 ± 6 years	37 ± 8 years	>0.05 (NS)

2.2. Operative technique

All patients were done via median sternotomy. Myocardial protection was done using antegrade cold blood cardioplegia via the aortic root with systemic cooling to 28 °C and topical cooling using ice slush. Mitral valve repair was done in 10 patients from group A and 3 patients from group B. Repair was usually done using the Carpentier–Edwards ring. The remaining patients had mitral valve replacement. After closure of the left atrium, deairing, and removal of the

Table 2
Operative data.

	Group A (62 patients)	Group B (18 patients)	P value
Mitral repair	10	3	
Mitral replacement	52	15	
Mechanical # 27	18	3	
Mechanical # 29	23	10	
Mechanical # 31	8	2	
Tissue valve	3	–	
Cross-clamp time	60 ± 4 min	58 ± 3 min	>0.05
CPB time	90 ± 32 min	110 ± 21 min	<0.05(S)

There were no significant differences between both groups regarding the cross-clamp time. The CPB time was however longer in the ring annuloplasty group.

aortic cross clamp, the cavae were snared and a right atriotomy performed to expose the tricuspid valve. Assessment of the degree of tricuspid regurge was usually done by intraoperative transesophageal echocardiography (TEE) prior to CPB. In Group B patients, tricuspid repair was done using the Carpentier–Edwards ring in 14 patients. In the remaining 4 patients, the Cosgrove flexible ring was used. The following table shows the operative data for both groups (Table 2).

2.3. Statistical analysis

All data were described as mean and standard deviation. All statistical calculations were done using SPSS (Statistical Package for Social Science). Qualitative data were described using number and percent. Association between categorical variables was tested using Chi-square test. When 25% of the cells have expected count less than 5, Fisher exact test was used.

Continuous variables were presented as mean ± SD (standard deviation) for parametric data. For all above mentioned statistical tests done, the threshold of significance is fixed at 5% level (p-value).
The results were considered:

- Non-significant when the probability of error is more than 5% ($p > 0.05$).
- Significant when the probability of error is less than 5% ($p < 0.05$).
- Highly significant when the probability of error is less than 0.1% ($p < 0.001$). The smaller the p-value obtained, the more significant are the results.

3. Results

There was only one mortality in Group A due to non cardiac causes 2 days postoperatively. There were no mortalities among group B patients. All patients of both groups had intraoperative assessment for the degree of tricuspid regurge post repair by TEE. All had trivial to mild tricuspid regurge. The following table (Table 3) shows the postoperative course for both groups.

Table 3
Immediate post-operative course.

	Group A	Group B	P value
Need for inotropic support	20	7	>0.05
Mechanical ventilation time	6 ± 3 h	5 ± 2.5 h	>0.05
ICU stay	2 ± 0.4 days	2 ± 1.1 days	>0.05
Hospital stay	7 ± 2.1 days	8 ± 1.5 days	>0.05

ICU: Intensive Care Unit.

Table 4
Echocardiography at discharge.

Degree of tricuspid regurge	Group A (62)	Group B (18)	P value
Trivial	23	12	>0.05
Mild	32	4	>0.05
Moderate	7	2	>0.05
Severe	–	–	>0.05

Table 5
Echocardiography at one year.

Degree of regurge	Group A (40)	Group B (14)	P value
Trivial	5	6	>0.05
Mild	11	4	>0.05
Moderate	20	3	>0.05
Severe	4	1	>0.05

Echocardiography was done for all patients of both groups prior to discharge. The following table shows the different grades of tricuspid regurge at discharge (Table 4).

Follow-up was done 1 year post-operatively by echocardiography. 40 patients from group A completed the follow-up period versus 14 patients from group B. The results are listed in the following table (Table 5).

4. Discussion

Optimal management of tricuspid valve disease remains a challenge among cardiologists and cardiac surgeons because patients are often asymptomatic [4]. Tricuspid regurge is most commonly functional secondary to left side pathology with left sided heart failure [5]. Tricuspid valve repair is indicated in symptomatic patients with significant tricuspid regurge despite optimized medical treatment. Tricuspid repair is also indicated in asymptomatic patients with significant tricuspid regurge undergoing concomitant cardiac surgery [3,6].

The ideal technique for tricuspid valve repair is still controversial. The DeVega suture technique is a simple procedure involving the plication of the tricuspid annulus from the anteroseptal to the posteroseptal commissure using 2 continuous sutures over Teflon pledgets [7]. Other investigators have reported however a high incidence of recurrence particularly in patients with severe annular dilatation and have recommended the use of annuloplasty rings to obtain a durable repair [8,9].

In our study, there was no statistically significant difference between the DeVega annuloplasty group and the ring annuloplasty group regarding the early postoperative outcome or even the one year follow-up. The only observed difference might be the longer operative time in the ring group, which might be attributed to the more complexity of the procedure. However, the limited number of patients and the short follow-up period are limiting factors.

Another study by Abdelfattah and Omar showed no significant difference at one year between tricuspid repair using DeVega annuloplasty and band annuloplasty using PTFE [10]. Also, Dokhan et al. studied the outcome of DeVega annuloplasty and had similar results [11].

We concluded that tricuspid repair using ring annuloplasty has good results, with low risks. However, a larger number of patients need to be included in the study as well as a longer follow-up period to determine its superiority and its better long term results compared to the DeVega technique.

Conflict of interest

No conflict of interest.

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