

SURGICAL REPAIR OF MODERATE TRICUSPID REGURGITATION HAS BETTER OUTCOME; EARLY HOSPITAL RESULTS

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Objective: To assess the effect of surgical repair on progression of moderate functional tricuspid regurgitation.

Background: There is consensus for repair of severe functional tricuspid regurgitation secondary to left sided valve diseases. However for the management of mild to moderate functional tricuspid regurgitation controversy remains.

Methods: From November 2011 to February 2012, 77 consecutive patients who underwent isolated mitral valve replacement, and had pre-operative diagnosis of associated moderate tricuspid regurgitation were identified. They were divided in two groups, namely; A & B. Group A consisted of the patients who underwent mitral valve replacement without tricuspid valve repair. Group B consisted of the patients who underwent mitral valve replacement with tricuspid valve repair. Outcome was assessed on the basis of

echocardiographic evaluation of residual tricuspid regurgitation.

Results: 26 patients underwent mitral valve replacement with tricuspid repair as compared to 51 patients, where tricuspid valve was ignored. Immediate post-operative outcome was comparable in both groups. However, pre-discharge echocardiography showed residual moderate tricuspid regurgitation in one patient in repair group while 23 patients in non repair group.

Conclusion: Immediate post-operative results are comparable, however, significantly better outcome was observed in the patient population, where tricuspid repair had been performed.

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INTRODUCTION

The tricuspid valve complex consists of three leaflets (anterior, posterior, and septal), the chordae tendinae, two discrete papillary muscles, the fibrous tricuspid annulus and the right atrial and right ventricular myocardium. Successful valve function depends on the integrity and coordination of these components. The anterior leaflet is the

largest whereas the posterior leaflet is notable for the presence of multiple scallops. The septal leaflet is the smallest and arises medially directly from the tricuspid annulus above the interventricular septum. The anterior papillary muscle provides chordae to the anterior and posterior leaflets and the medial papillary muscle provides chordae to the posterior and septal leaflets.

The septal wall gives chordae to the anterior and septal leaflets. Functional tricuspid valve regurgitation is often a common associated lesion with mitral and aortic valve diseases. In majority of cases tricuspid regurgitation is a secondary phenomena of back pressure due to left sided valve

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diseases. When TR is present with left sided valve lesions in absence of any structural deformity of tricuspid leaflets or chordi is called functional or secondary TR¹. Functional TR is a usually consequence of annular dilatation (annular dilatation > 3.5cm). While annular dilation can occur in absence of TR. Because the small septal wall leaflet is fairly fixed, there is little room for movement if the free wall of right ventricular/tricuspid annulus should dilate². Dilation of the tricuspid annulus therefore occurs primarily in its anterior/posterior (mural) aspect which can result in significant functional TR as a result of leaflet malcoaptation³. TR may also results of pulmonary hypertension and septal papillary muscle displacement secondary to left ventricular dysfunction and chronic lung diseases⁴. Braunword and others are of opinion that functional TR is reversible phenomena that regress with the surgery of primary left sided valve⁵⁻⁶. Still this approach is quiet prevail as tricuspid surgery comprised only one-tenth of the 40 000 mitral valve operations performed yearly in the United States⁷. Despite of it there was opinion by other like Brayer and others suggest to address TR as early as in 70s as the believe tricuspid regurgitation is a progressive phenamena^{8,9,10}. As it is also reported that even mild TR can progress despite treating the primary left sided valve lesion^{11,12}. This untreated TR may result significant RV dysfunction with poor long term outcome¹³.

METHODS

If we review the literature most of the data about functional TR is secondary to degenerative mitral valve diseases as majority of literature published from western world where rheumatic heart disease is significantly cured. These patients usually present in older age group. We aim to document the effect of surgical repair on moderate functional tricuspid regurgitation secondary to rheumatic mitral valve disease. It was a prospective observational study carried out in cardiac surgery department of National institute of cardiovascular diseases. This was a single blind

study as operating surgeons were not involved in initial data collection. Data was collected from May 2011 to Feb. 2012. A consecutive sampling technique was used. All the patients with functional moderate tricuspid regurgitation operated for isolated rheumatic mitral valve disease were included in study. While patients with mild and severe tricuspid regurgitation. Functional tricuspid Regurgitation associated with lung pathology was excluded. Decision to address or not address tricuspid valve were left on surgeons' discretion and reasons for their choice were not included in study. Same way the type of tricuspid valve repair technique were also left on surgeon's discretion.

Total 77 patients were included in study, divided in two groups A) MVR B) MVR+Tricuspid repair.

BASIC CHARACTERISTICS OF GROUPS

	MVR group	MVR + tricuspid repair
n	51	26
Sex	M= 14, F=37 M:F 1:2.6	M=7, F19 M/F 1:1.3
Age	14 to 35 Median 27y	16 to 38 Median 31 years
Atrial fibrillation	45/51 (88%)	21/26 (81%)

Surgical Technique

All the patients were operated via median sternotomy. Aorto – bicaval cardiopulmonary bypass with moderate hypothermia used. Myocardial protection was achieved by antegrade cold blood cardioplegia Mitral valve repair / replacement was done via trans left atrial or tras septal approach .Tricuspid valve repaired by annuloplasty or bicuspidilization technique .

RESULTS

Total of 77 patients with mitral valve disease with functional TR were evaluated. Post operative outcome was assessed with following vairbles; ICU stay, low cardiac output arrhythmia and severity of tricuspid regurgitation in both groups.

ECHOCARDIOGRAY DATA

	MVR group	MVR + tricuspid repair
LESION	MR=41MS=9,MSMR=1	MR=20,MS=6
EF%	EF=75 +/-15	EF=70 +/-10
PAP = >50mmgh	43 (84%)	26 (100%)
TR	MODERATE TR	MODERATE TR
LV DIMENSION	LV END-SYSTOLIC DIMENSION= 22 TO 54mm LV END-DIASTOLIC DIMENSION=48 TO 68mm	LV END-SYSTOLIC DIMENSION=23 TO 48mm LV END-DIASTOLIC DIMENSION=47 TO 59mm
RV DIMENSION	RV DIMENSION 18 mm TO 30 mm	RV DIMENSION 19mm TO 34mm
LA DIMENSION	LEFT ATRIAL DIMENSION=48 TO77mm	LEFT ATRIAL DIMENSION= 49 TO 65mm

OPERATIVE OUTCOME

Operative Procedure	MVR Group	MVR + Tricuspid Repair
MVR	51	26
Tricuspid Repiar	0	26
Annuloplasty	0	21
Bicuspidilization	0	5
Sub Valvular Structure Perservation	39	18
Operative Mortality	0	0

EARLY POSTOPERATIVE OUTCOME

	MVR GROUP n =51	MVR + TRICUSPID REPAIR n =26
ICU stay > 48 hours	4	3
Low cardiac output	2	0
Excessive Mediastinal bleed	1	0
Arrhythmias	38	16

ECHOCARDIOGRAPHY POST OPERATIVE

GROUP	PRE-OP	1st POD	10th POD
MVR GROUP	MODERATE: 51	MODERATE: 22 MILD: 29	SEVERE: 1 MODERATE: 22 MILD: 26 NO TR: 1
MVR + TRICUSPID REPAIR	MODERATE: 26	MILD: 9 NO TR: 17	MODERATE: 1 MILD: 6 NO TR: 19

A better outcome is documented in patients with tricuspid repair for improvement in functional TR compare to non-repair group .

DISCUSSIONS

Tricuspid valve is a forgotten valve. If we make review of literature from 1991 to 2000; 1498 papers of mitral valve surgery, 1447 papers of aortic valve surgery and just 335 papers of

tricuspid valve surgery were found in English literature¹⁴. Despite of the prevalence of functional tricuspid regurgitation of about 20% to 30% in patients undergoing mitral valve surgery¹⁵. It is just in last decades that a little bit emphasis was given to functional TR. As there is growing awareness that tricuspid regurgitation specially secondary to annular dilation should be address as annulus is a dynamic structure once start to dilate it continue to dilate despite of correction of primary pathology that is left sided valve lesion. As the left atrial and pulmonary pressure increase over time secondary to MV diseases, longstanding pressure overload to the right ventricle induces right ventricular enlargement, tricuspid annular dilatation and leaflet tethering and it may persist especially in patients who develop right ventricular dysfunction^{16,17}. These pathological changes on tricuspid valve geometry cause functional TR¹⁸. Katsuhiko et al followed the unrepaired tricuspid regurgitation 1+ and 2+ secondary to mitral valve disease in 174 patients over 8 years and found significant TR progression in 28 patients, 11 with mild TR and 17 with moderate TR initially¹⁹. Matsuyama K, and colleagues also present with same results of 16% patient progress to sever TR following the treating the mitral valve²⁰. Possible risk factors for TR progression includes Pulmonary hypertension, higher RV diameter with tricuspid valve annulus dilatation and decreased RV ejection fraction,atrial fibrillation , Giant left atrium are also considered risk factor for progression of tricuspid regurgitation if left untreated^{17,21}. When left untreated TR may progress and results in right ventricular failure. That may

need redo surgery with its entire hazard. Tricuspid valve repair for severe tricuspid regurgitation years after mitral valve surgery, associated with mortality rates up to 32% and 5-year survivability is less than 50%^{22,23}. There is growing consciences to address mild and moderate TR. Moderate tricuspid regurgitation due to left sided valve diseases should be treated to improve patient outcomes by giving benefit of doubt to prevent regurgitation progression and RV dysfunction²⁴.

While we have present very short term results. Both the groups have comparable preoperative variables. Both groups have similar results for postoperative course and complication. While group with tricuspid repair have better results for TR progression.

CONCLUSION

Considering our part of world where most of patients are suffering from rheumatic valvular heart diseases. Our patient population is usually younger age group with larger life expectancy. Therefore they are more prone to RV failure if their TR fails to regress. Therefore on expenditure of few more minutes we address their TR it will save them from possible future RV failure

LIMITATION

Major limitation of our study was small sample size and we had relay on in hospital echo as there is still chance of TR improvement in few months ahead. Second important limitation; severity of TR based on volume status of patients as hypovolemia may underestimate TR. therefore we can't strongly support our results as might our second group had more fluid restriction then unrepaired group.

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