

Tricuspid Regurgitation with PTFE Strips at 108 Military Central Hospital

Do Xuan Hai¹, Hoang Anh Tuấn², Mai Van Vien³, Nguyen Thi Hoa⁴

¹ MD, Ph.D., Head of Practical and Experimental Surgery – VMMU, Viet Nam (Corresponding author)

^{2,3} Department of Cardio-Thoracic Surgery - 108 Military Central Hospital, Viet Nam

⁴ Department of Faculty Treatment Upon Request - 108 Military Central Hospital, Viet Nam

Abstract: Introduction: The result of tricuspid valve repair in patients with mitral valve replacement due to rheumatic heart disease is very difficult to predict. From AHA and ESC guidelines, we use PTFE strips in tricuspid valve repair at the hospital. Methods: Modified tricuspid valve in mitral valve replacement surgery in patients with or without tricuspid valve on ultrasound but valve diameter > 35 mm (determined on ultrasound before surgery and measuring the diameter of ring valve during surgery) Result: The average age is 48.1 ± 9.2 , the tricuspid dilatation and valve diameter > 35 mm, the rate of moderate-severe open tricuspid valve before surgery was 65.6%. Tricuspid regurgitation after surgery in the non-corrected tricuspid group was 10.6%, the corrected group was 13.3%, Postoperative follow-up showed an increase in tricuspid regurgitation in the unrepaired group, closely related to an increase in NYHA postoperative. Conclusion: The innovative method of using PTFE strips in fixing long-track tricuspid valves shows good results.

Keywords: Tricuspid regurgitation, Mitral valve replacement

1. Introduction

We all agreed that systemic mitral valve repair should be done in tricuspid valve surgery (mitral valve disease primarily due to Rheumatic fever). In this study, we corrected the tricuspid valve according to the guidelines of AHA and ESC with tricuspid valves measured in echocardiography and measured in surgery from 35 mm and using PTFE strips [1], [2]. The rate of tricuspid regurgitation after mitral valve replacement with St.Jude Masters (SJM) mechanical valve and the effectiveness of PTFE stripping technique at 108 Military Central Hospital.

2. Materials and Methods

Including 122 patients received surgical mitral valve replacement with SJM mechanical with or without tricuspid valve repair at 108 Military Central Hospital from May 2010 to December 2015.

In this study, the patients were thoroughly examined for clinical and laboratory pre-surgery. Criteria based on AHA / ACC guidelines [1], [2].

Postoperative follow-up 6 times in the first year and 4 times from the 2nd year: Clinical examination, echocardiography, INR testing.

The technique for using PTFE strips at the 108 Military Central Hospital (Figure 1):

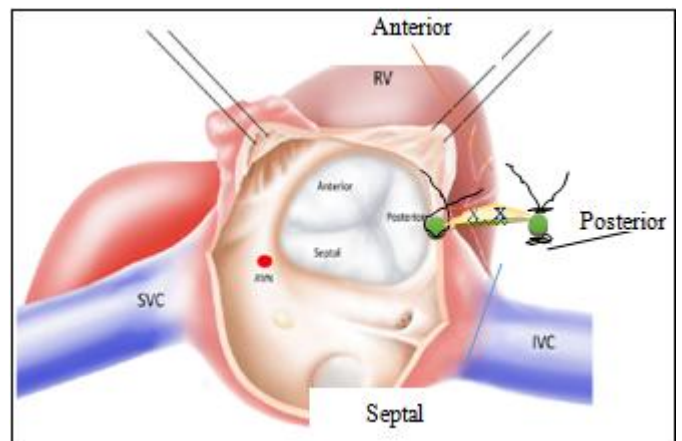


Figure 1: Tricuspid valve repair

- 1) Build the pillar at the posteroseptal like Kay method using PTFE.
- 2) Build the pillar at the anteroseptal commissure by Ethibond 2.0 stitches into the anterior cusp of the tricuspid valve (fiber frame to the right of the tricuspid valve)
- 3) Connecting the rear and front pillars with a strip of PTFE (the length even tricuspid annulus valve of the septal leaflet)

3. Result

Table 1: Age and gender characteristics (n = 122)

Characteristics	Male		Female		Total	
	n	%	n	%	n	%
Age ≤ 60	42	93,3	73	94,8	115	94,3
Age > 60	3	6,7	4	5,2	7	5,7
Total	45	36,9	77	63,1	122	100
Average (age)	47,0 ± 10,5		48,7 ± 8,3		48,1 ± 9,2	

Mean age was 48,1 ± 9,2, no difference in mean age of male and female.

Wilkins ≥ 8 point was 100%. Sinus rhythm and thrombosis were about 30%.

Table 2: Some clinical and historical characteristics (n = 122)

Clinical characteristics, medical history		%
Anamnesis of rheumatic fever	Treatment	48.4
	No treatment	20.5
Anamnesis of mitral valve intervention	Closed heart surgery	5.7
	Percutaneous balloon mitral valvotomy	16.4
NYHA class	II	65.6
	III	34.4
Shortness of breath on exertion		96.7
Palpitations		92.6
Arrhythmia		65.6

Anamnesis of Rheumatic fever accounted for high rates of 68.9%, 16.4% of patients underwent percutaneous balloon mitral valvotomy, NYHA II and III were 100%. Symptoms of mitral valve disease such as Shortness of breath, palpitations were > 92% and arrhythmia was 65.6%.

Table 3: Some major paraclinical characteristics (n = 122)

Paraclinical features		%
Electrocardiogram	Sinus rhythm	34.4
	Atrial fibrillation	65.6
Echocardiography	Very severe mitral stenosis	9.8
	Severe mitral stenosis	52.5
	Severe mitral valve regurgitation	9.0
	Severe systolic pulmonary artery hypertension	13.1
	Thrombosis of atrium	31.9
	Thickening and sticky of mitral valve	95.9
	Calcification of mitral valve	74.6
	The ligaments of the mitral valve are shrinking	81.1
	Wilkins echocardiographic scores ≥ 8 point	100%

Typical mitral valve injury due to rheumatic fever in echocardiography includes: thickening and sticky, calcification of mitral valve and ligaments injury (> 74%),

Table 4: Open tricuspid valve on ultrasound imaging (n = 122)

Tricuspid valve	Tricuspid regurgitation degree				Total n (%)
	0 và I n (%)	II n (%)	III n (%)	IV n (%)	
Mitral valve	4 (6,8)	4 (15,4)	3 (9,4)	2 (40,0)	13 (10,7)
Mitral valve stenosis	4 (6,8)	4 (15,4)	3 (9,4)	0	11 (9,0)
Mitral valve regurgitation	51 (86,4)	18 (69,2)	26 (82,3)	3 (60,0)	98 (80,3)
Mitral valve stenosis and regurgitation	59 (100)	26 (100)	32 (100)	5 (100)	122 (100)
Total	59 (48,4)	26 (21,3)	32 (26,2)	5 (4,1)	122 (100)

51.6% of patients had moderate-severe tricuspid regurgitation. Mainly in the group with lesions coordination mitral regurgitation and stenosis valve (80,3%)

Table 5: Early tricuspid regurgitation after surgery (n = 122)

Tricuspid valve	Tricuspid regurgitation soon after surgery			Total n (%)
	0 và I n (%)	II n (%)	III n (%)	
No repairs (n = 47)	42 (35,9)	2 (22,2)	3 (50,0)	47 (38,5)
By PTFE strip (n = 75)	65 (86,7)	7 (9,3)	3 (4,0)	75 (61,5)
Total	107 (87,7)	9 (7,4)	6 (4,9)	122 (100)

38,5% formed tricuspid valve with PTFE strip, moderate and severe tricuspid regurgitation accounted for 10,6%. Patients with tricuspid valve repair in replacement of mechanical mitral valve SJM, the rate of moderate and severe tricuspid regurgitation accounted for 13,3% (before the surgery are not tricuspid regurgitation).

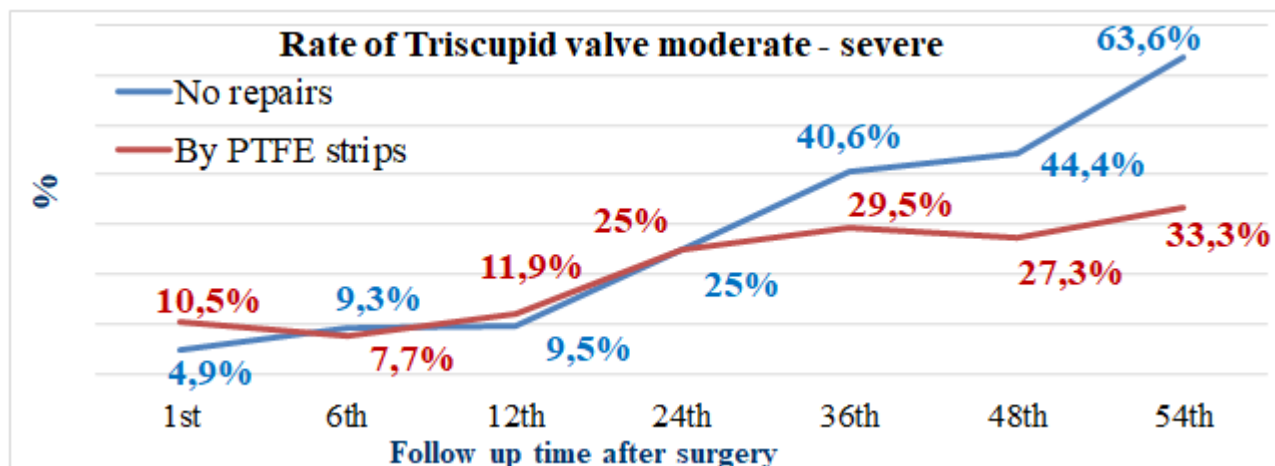


Figure 1: Tricuspid regurgitation over time

Followed at 1 month, 6 months, 12 months, 24 months, 36 months, 48 months and 54 months: In the group with not repaired tricuspid is increased tricuspid regurgitation, especially from the second year after surgery ($p < 0,05$).

Table 6: Classification of heart failure according to NYHA

Follow-up time after surgery	Tricuspid regurgitation				p
	No repairs (n = 47)		By PTFE strip (n = 75)		
	0 và I n (%)	II và III n (%)	0 và I n (%)	II và III n (%)	
1st month (n = 122)	35 (74,5)	12 (25,5)	50 (66,7)	25 (33,3)	< 0,05
3rd month (n = 121)	42 (91,3)	4 (9,7)	58 (77,3)	17 (22,7)	< 0,05
6th month (n = 121)	39 (84,8)	7 (15,2)	56 (74,7)	19 (25,3)	> 0,05
24th month (n = 115)	32 (78,0)	9 (22,0)	42 (56,8)	32 (43,2)	< 0,05
36th month (n = 82)	22 (64,7)	12 (35,3)	25 (52,1)	23 (47,9)	> 0,05
48th month (n = 34)	10 (47,6)	11 (52,4)	7 (53,8)	6 (46,2)	-
54th month (n = 19)	8 (66,7)	4 (33,3)	4 (57,1)	3 (42,9)	-

In the group with not repaired tricuspid is increased moderate and severe heart failure (NYHA II-III). Especially from the second year after surgery ($p < 0,05$).

4. Discussion

In Vietnam, as a result of rheumatic heart, damage to the heart is often very severe, especially the valve system. The disease progresses continuously from adolescence, so the average age of the research group is lower than the developed countries with valve disease mainly due to degeneration. Female patients are more likely than men due to the role of the DR4 antigen factor, which is more common in women [3].

In the literature, it is pointed out that the damage due to low rarely in the tricuspid valve so tricuspid valve opening is mainly mechanical function due to right ventricular dilatation and will gradually decrease with the decrease of pulmonary artery pressure. Studies have shown that valve dilatation is characteristic of tricuspid regurgitation [4]. Author Fukunaga: the unusual form as ring valve within the valve pan, flat or round [5]. The results of moderate and severe tricuspid regurgitation in our study accounted for 51.6%, similar to the domestic studies with the rate of 60% - 90% [4], [5], [6]. Overseas studies suggest that the true frequency of secondary tricuspid regurgitation is not known [4], [5].

In this study, due to the persistent, persistent elevation of pulmonary artery pressure, the dilatation of the tricuspid valve (> 35 mm) and changes in valve organization (waterlogged). Therefore, we repaired the tricuspid valve with PTFE strips to overcome the situation and be cheap.

Examination before surgery found that the anterior and posterior motility and dilatation mainly in the tricuspid regurgitation, the septal leaves are inactive. This technique will minimize torn foot sutures especially pleat the front valve, the back valve causes re-opening of De Vega, reducing movement when using the valve ring.

In the group without tricuspid valve repairing was 10.6% and in the group using the PTFE band, 13.3% had early moderate-severe tricuspid regurgitation after surgery. The result of early echocardiography after surgery showed a decrease in the average right ventricular diameter and pulmonary artery pressure. This may find it difficult to predict tricuspid regurgitation after mitral valve replacement

Tricuspid regurgitation tends to increase over time in both groups, similar to other studies such as Matsunaga's author of 5 years of monitoring [4]. Therefore, the author recommends tricuspid valve repair in cases of left atrial fibrillation with atrial fibrillation even without tricuspid regurgitation. Predictive factors for severe open tricuspid valve replacement in mitral valve surgery by Matsuyama: Left diameter at left > 60mm, an extension of tricuspid valve circumference > 39mm and increased severe pulmonary artery pressure before surgery [7].

However, the long-term results of tricuspid valve repair are unpredictable and a challenge for the surgeons. It is clear that severe tricuspid regurgitation after valve replacement will promote faster heart failure, increasing mortality in patients with mitral valve replacement [4], [8], [9].

Our results show that there is an increase in the degree of heart failure in the non-tricuspid group (especially from the second year after surgery). In the tricuspid valve repair group, NYHA heart rate was relatively stable after surgery

The results of our study contribute suggestions using PTFE strips in shaping the tricuspid valve to overcome fibrosis and not a soft condition by causing an artificial valve ring.

5. Conclusion

It is important to fix the tricuspid valve systematically in mitral valve replacement surgery to reduce postoperative heart failure. Using PTFE strips in the repair tricuspid valve is good after surgery.

References

- [1] Bonow R.O., et al. (2008). Practice Guideline 2008 Focused Update Incorporated Into the ACC/AHA 2006 Practice Guideline Guidelines for the Management of Patients With Valvular Heart Disease. *Circulation*, American Heart Association.
- [2] ESC guidelines (2007). Guidelines on the management of valvular heart disease. *European Heart Journal*, 28: 230 - 268.
- [3] World Health Organization (2004). *Rheumatic fever and rheumatic heart disease*. Report of a WHO Expert Consultation Geneva, 1 - 122.
- [4] Matsunaga A., Carlos M.G., Duran (2005). Progression of Tricuspid Regurgitation after Repaired Functional Ischemic Mitral Regurgitation, *Circulation*, 112: 453-457.

- [5] Fukunaga N., Okada Y., Konishi Y., et al. (2015). Late outcome of tricuspid annuloplasty using a flexible band/ring for functional tricuspid regurgitation, *Circulation Journal*, 79: 1299 –1306.
- [6] Navia J.L., Brozzi N.A., Klein A.L., et al (2012). Moderate Tricuspid Regurgitation With Left - Sided Degenerative Heart Valve Disease: To Repair or Not to Repair?, *Ann Thorac Surg*, 93: 59-69.
- [7] Matsuyama K., Matsumoto M., Sugita T., et al. (2003). Long-term results of reoperative mitral valve surgery in patients with rheumatic disease. *Ann Thorac Surg*, 76: 1939 - 1943.
- [8] Correia P.M., Coutinho G.F., Antunes M.J., (2013). Tricuspid valve: a valve not to be forgotten. *the ESC Council for Cardiology Practice*, 11(20-23): 1-7.
- [9] Shiran A., Sagie A. (2009). Tricuspid Regurgitation in Mitral Valve Disease, *Journal of the American College of Cardiology*, 53 (5): 401-408.