



# Results of the De Vega Plasty in Tricuspid Insufficiencies Secondary to Mitral and Aortic Rheumatic Valve Diseases: Study of 58 Cases

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**Abstract:** Assess the short, medium and long-term efficiency of the De Vega tricuspid plasty. The study was retrospective (7 years and 11 months) and included all patients operated for valve diseases associated with functional tricuspid regurgitation (TR). The Epi Info software was used for descriptive analysis and logistic regression. There was a total of 58 patients with an average age of 26 years. In preoperative transthoracic echocardiography (TTE), 44.6% of patients had stage III TR. After De Vega plasty, the immediate postoperative TTE showed no tricuspid leak in 23.5% of patients, a minimal leak in 62% of patients and a moderate leak in 14.5% of patients. After a 41-month follow-up, 25% of living patients had no more TR and 30.56% had minimal insufficiency. Moderate insufficiency persisted in 30.56% of cases, and severe in 13.89% of cases. All patients with severe long-term TR had hemodynamic instability during reanimation ( $p = 0.002$ ). De Vega plasty is a low-cost technique that does not extend the surgical time. It is adapted to the functional tricuspid regurgitation surgery in disadvantaged areas.

**Keywords:** De Vega Plasty, Tricuspid Regurgitation, Cardiac Surgery

## 1. Introduction

Tricuspid insufficiency is the least common cardiac valvulopathy (1). It appears in the form of a functional tricuspid regurgitation, secondary to a mitral and / or aortic valve diseases. The etiology is dominated by the rheumatic disorder (2). De Vega plasty is a technique for reconstructing the tricuspid ring. It consists of making a double suture over the tricuspid ring to shrink it, while avoiding the conduction

zone.

The aim of this study is to evaluate the short, medium, and long-term efficiency of the De Vega tricuspid plasty.

## 2. Method

The study is retrospective and descriptive. Data were collected from records of patients operated for cardiac valve diseases. It took place over a period of 8 years (January 2007

to December 2015) with an average follow-up duration of 41 months for each patient. All patients operated for mitral, and / or aortic valve diseases and for functional tricuspid insufficiency (De Vega plasty) were included in the study. The statistical analysis used the Epi Info software; the Data Analysis tab which presents several functionalities was used for the tabulation of the descriptive statistics and the crossings between the variables. The data obtained were compared to those obtained by the SPSS and Stata software. The P-values of the different crossings were obtained through the Stata software. These values are compared with those of SPSS. The chi-square test with the Pearson coefficient was used for the determination of P-values.

### 3. Results

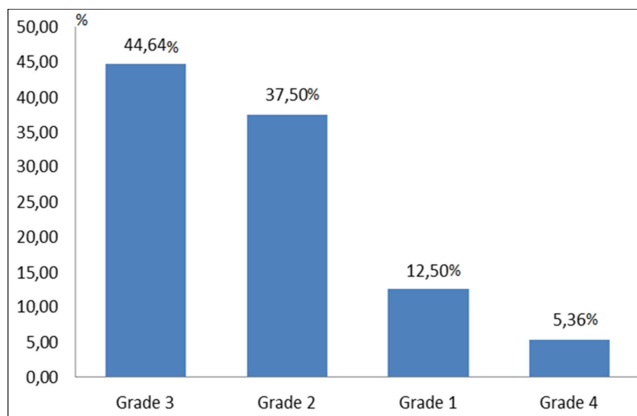
#### 3.1. Clinical Exam

The total number of patients was 58, with 63% of female,

*Table 1. Echographic aspects of preoperative valve lesions.*

	Mitral regurgitation	Mitral stenosis	Aortic regurgitation	anterior leaflet prolapse	posterior leaflet restriction	Fusion of commissure	Valve fibrosis
Yes	72,41%	55,56%	60,71%	74,55%	69,09%	54,55%	96,5%
No	27,59%	44,44%	39,29%	25,45%	30,91%	45,45%	3,5%

All patients had functional tricuspid insufficiency (Figure 1).



*Figure 1. Distribution of preoperative tricuspid insufficiency.*

The average tricuspid annular dimension (TAD) was 42.5mm (28-63mm). The right ventricle (RV) - right atrium (RA) gradient was 55.7mm Hg on average. The average systolic pulmonary arterial pressure (PAPS) was 73mm Hg (28-110mm Hg).

#### 3.3. Surgery

The approach was a vertical median sternotomy. The mitral valve was approached by a left atriotomy. The aortic valve was replaced by a transverse aortotomy, while the tricuspid valve was repaired from an incision in the right atrium. Mitral plasty was performed in 11% of patients and mitral valve replacement in 89% of patients. Compared to all valve replacements, mitral valve replacement was performed in 83% of patients, an aortic valve replacement in 2.38% of

so a sex ratio of 0.58. The average age was 26 y/o (7-63 y/o). On average, the patient's dyspnea was at stage III (NYHA).

A history of recurrent angina and rheumatic fever was present in 77% and 65% of patients, respectively. All patients were on diuretic therapy.

#### 3.2. Para Clinical Exam

On the chest x-ray, the average cardiothoracic ratio (CTR) was 0.67 (0.5 -0.84).

The electrocardiogram showed complete arrhythmia by atrial fibrillation (AFIB) in 48% of patients, and 9% had a branch block.

In transthoracic echocardiography (TTE), the diameter of the right ventricle was greater than 28 mm in 24.5% of cases. The tricuspid annular plane systolic excursion (TAPSE) had an average value of 17.05mm (5 - 30mm). The average systolic ejection fraction (EF) was 63% (42-83%). Valve lesions were listed in Table 1.

patients, and double valve replacement in 14.29% of the patients. A mechanical valve was implanted in 75.44% of the cases and the other patients received a bioprosthesis.

#### 3.4. Post Operative Period

Immediate post-operative trans-thoracic echocardiography showed a lack of tricuspid leakage in 23.5% of patients, a minimal leak in 62% of patients and a moderate leak in 14.5% of patients. The systolic ejection fraction after extracorporeal circulation was an average of 50% (25-66%). The average mitral gradient was 4.10 mmHg (1-13 mmHg). Hemodynamically unstable patients were kept under amines in intensive care. Morbidity in intensive care was dominated by hemodynamic complications (52%), pleuropulmonary complications (25%) and cardiac rhythm disorders (18%). Secondary complications were dominated by superficial surgical site infections (6.25%), deep site infections (8.33%) and pneumonia (4.17%).

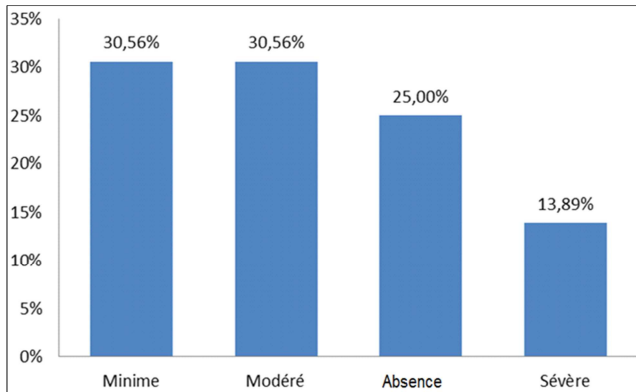
The postoperative mortality was 10.91% and the late mortality was 11.5%. Causes of death were related to hemodynamic disorders, infectious complications, or rhythm disorders.

#### 3.5. Follow up

After the De Vega tricuspid plasty, 89% of patients had stage I dyspnea. The percentage of patients without insufficiency after 3 months was 21%. Minor insufficiency persisted in 63% of cases, moderate insufficiency in 10.8% of cases, and severe insufficiency in 5.26% of cases. The systolic pulmonary arterial pressure was 42mm Hg on average (23-110mm Hg). The follow-up lasted for around 41

months (10-70 months). At the last cardiac ultrasound, 25% of the living patients had no insufficiency and 30.56% had minimal insufficiency. Moderate insufficiency persisted in 30.56% of cases, and severe in 13.89% of cases.

The results are summarized in Figure 2.



**Figure 2.** Patients distribution by long-term tricuspid insufficiency grade.

Of the 6 patients with severe long-term TI, only one patient had a grade 4 preoperative tricuspid leak, the remaining 5 had a grade 2 leak. Of the 18 patients who had moderate TI, one (5.6%) had a preoperative grade 4 tricuspid leak, five patients (27.8%) had grade 3 leakage, and 8 patients (44.4%) had a leak of grade 2. A leak of grade 1 was found in 4 of them (22.2%). Patients with a double valve or aortic valve alone did not have severe long-term TI, while 13.6% of patients with mitral valve replacement had severe leakage. All patients with severe long-term TI had hemodynamic instability on intensive care ( $p = 0.002$ ). No deceased patients had grade 4 preoperative TI, but 75% had grade 3 TI ( $p = 0.058$ ). Dobutamine ( $p = 0.151$ ) was used in 14.71% of deaths cases and adrenaline ( $p = 0.001$ ) in 45.45% of deaths.

## 4. Discussion

The De Vega tricuspid plasty is performed for functional tricuspid insufficiency in mitral and / or aortic valve surgery. Patients are rarely referred for isolated tricuspid valve surgery [3].

The rheumatic etiology is predominant in the underdeveloped countries and the population of patients is young, unlike the Western countries where degenerative causes are dominant [4].

Surgery improves the functional status of patients and thus their quality of life [5]. De Vega's annuloplasty was successful with a rate of 85.5% in the immediate postoperative period. In the literature, studies have demonstrated the effectiveness of De Vega's plasty in tricuspid insufficiencies due to functional dilation of the ring [6]. The results of Morishita's study [7] carried out on 408 patients indicated the non necessity of reoperation in 91.6% of patients operated by De Vega annuloplasty after a 15-years follow-up. The improvement in hemodynamic factors related to the correction of left valvulopathies influenced the success

of De Vega's plasty by favoring the reduction of the diameter of the tricuspid ring in the long term. In fact, the average pulmonary arterial pressure increased from 72, 9 mmHg preoperatively to 34.5 mmHg in the long term, so a decrease of 38.4 mmHg. The grade of preoperative TI is a determining factor in the long-term effectiveness of De Vega's plasty. In the study by Ghodbane W. and al. [8], severe preoperative TI is also a predictor of failure of tricuspid plasties. All patients with severe preoperative TI had hemodynamic instability in intensive care.

The greater the correction of the left valvular lesions responsible for pulmonary arterial hypertension is complete, the greater the De Vega's plasty is long-term efficient [9]: long-term severe TI is not found in patients with double replacement Valvular disease while it was present in 13.8% of patients with mitral valve replacement. The severity of the preoperative dyspnea and the alteration of the left ventricular ejection fraction have a negative impact on the long-term results of De Vega's plasty [1]. In our study, the body mass index, the functional class of dyspnea, and atrial fibrillation do not influence postoperative mortality. However, these 3 elements may constitute factors of operative mortality. The severity of preoperative TI is a factor that influences postoperative mortality. Thus the correction of the annular dilatation before the appearance of more severe clinical or ultrasound TI has many benefits. Adrenaline administration is a factor of poor prognosis and influences post-operative mortality. Causes of death in patients who undertook tricuspid surgery are related to haemodynamic disorders and multi-visceral failure [10]. Some authors prefer the long-term superiority of prosthetic annuloplasty rather than De Vega's annuloplasty [11]. The implantation of a prosthetic ring improves the survival of the patients and reduces the risk of recurrence of a severe or moderate long-term TI compared to a classic or modified De Vega's plasty [12].

## 5. Conclusion

De Vega's plasty is a low-cost technique that does not extend the surgical time; it is suitable for surgery of functional tricuspid insufficiency in disadvantaged environments. However, prosthetic annuloplasty remains the most effective long-term technique for the correction of tricuspid insufficiencies.

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