

## A STUDY OF INDICATIONS, COMPLICATIONS OF PROSTHETIC VALVES AND PROGNOSIS AFTER TREATMENT OF STUCK VALVE

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### ABSTRACT

#### BACKGROUND

Implantation of prosthetic cardiac valves to treat haemodynamically significant valvular diseases has become common; however, it is associated with complications. Thus, this study was intended to evaluate the indications for implantation of prosthetic valve and complications after its implantation and prognosis after treatment of one of its complication, i.e. stuck valve.

#### MATERIALS AND METHODS

This was a single-centered study wherein 50 patients who came to the emergency department with stuck valve were assessed. The 2D echocardiography was performed in all patients. Thrombolysis was done and the gradients were reassessed. Further response to treatment and development of complications before and after treatment were observed.

#### RESULTS

Of total patients, 60% were females. Mean age group was 30-40 yrs. Most of them were asymptomatic for 6 years and there was lack of compliance in 90% of patients. Most common indication for valve replacement was mitral stenosis (60%) followed by mitral regurgitation (20%), aortic regurgitation and aortic stenosis (10%) and combined mitral and tricuspid regurgitation (10%). Commonest valve was St. Jude (90%). Pannus was observed in 10% patients and thrombus was observed in 50% patients. Most patients had gradients 45/20 mmHg across mitral valve. In about 90% patients, gradients decreased after thrombolysis (12/5 mmHg). The complications after thrombolysis were hemiparesis (4%), death before thrombolysis (6%) and death after thrombolysis (4%).

#### CONCLUSION

Considering these results, it can be concluded that prosthetic valves are seldom associated with some complications. Further, thrombolysis can be effective in patients with prosthetic valve thrombosis.

#### KEYWORDS

Heart Valve Prosthesis; Streptokinase; Thrombolysis.

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#### BACKGROUND

About 100 million people are affected with valvular heart disease in the world, which has been allied with significant morbidity and mortality. Though, surgery has been the mainstay for its treatment, prosthetic valve implantation has transpired extensively in past few years.<sup>1</sup> However, prosthetic valves are not devoid of complications, which include valve thrombosis, primary structural failure,

endocarditis, pseudoaneurysm, obstruction of valve due to thrombosis or pannus formation, etc.<sup>2,3</sup> The occurrence of such complication depends on the location and type of prosthesis used, such that 0.5% to 6% in the aortic and mitral valves and up to 20% in the tricuspid valve.<sup>4,5</sup> The most common cause behind the complication is inappropriate anticoagulant therapy<sup>6,7</sup> followed by pathogenic causes and valve-related causes. The pathogenic factors include mitral position of the prosthesis, type of prosthesis, atrial fibrillation, left atrium enlargement, ventricular dysfunction, multiple valve replacements, pregnancy, traumatic manipulation of the prosthesis and Ebstein's anomaly<sup>8</sup> and valve related factors involve thrombogenicity of valve material, flow separation and stagnation, shear stress damage of blood elements and endothelium with platelet activation and release of thrombogenic factors.<sup>9</sup>

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With the passage of years, thrombolysis has been preferred as an alternative to surgery; fibrinolysis, heparin treatment or optimisation of anticoagulant and antiplatelet therapy have been considered depending on the presence of obstruction, prosthesis location, thrombus size and clinical status.<sup>10</sup> However, each of the therapeutic modalities have been associated with some or other complications and the optimal management of patients with prosthetic valve thrombosis remains controversial. Thus, this study was intended to evaluate the indications for implantation of prosthetic valve and complications after its implantation and prognosis after treatment of one of its complication, i.e. stuck valve.

## MATERIALS AND METHODS

This was a single-centered study wherein 50 patients who came to the emergency department with stuck valve were assessed. The 2D echocardiography was performed in all patients. All patients included in the study had clinical and echocardiographic evidence of some complication in the previously implanted prosthetic valve. Each patient was carefully evaluated echocardiographically for the presence of any clot and/or pannus.

All patients underwent detailed clinical evaluation, basal routine investigations, which included haemogram, biochemical tests, International Normalised Ratio (INR) and chest x-ray were also carried out. Thrombolysis was done and the gradients were reassessed. Further response to treatment and development of complications before and after treatment were observed.

Continuous variables are presented as mean  $\pm$  standard deviation and categorical variables are expressed as percentages.

## RESULTS

Of total patients, 60% were females. Mean age group was 30-40 yrs. Of these, 80% presented with shortness of breath, 20% with palpitations, tachycardia was seen in 80% patients, blood pressure was  $<100/70$  mmHg in 80% patients, haemoglobin was  $<8$  gm% in 60% patients, serum bilirubin elevated in 46% patients, most of them were asymptomatic for 6 years and there was lack of compliance in 90% of patients (Table 1). Drug used was Acitrom (acenocoumarol) 2 mg in 90% patients and drug interaction with digoxin is seen in 4%. The INR was less than 1.5 in 26% of patients. Cardiomegaly was observed in 60% and 2D echocardiography showed global hypokinesia in 60% patients. Most common indication for valve replacement was mitral stenosis (60%) followed by mitral regurgitation (20%), aortic regurgitation and aortic stenosis (10%), combined mitral and tricuspid regurgitation (10%) (Table 2).

Commonest valve was St. Jude Medical Mechanical Heart Valve (St. Jude Medical Inc., St. Paul, Minnesota), implanted in 90% of patients and the rest were TTK Chitra heart valves (TTK Healthcare Limited, Kerala, India). The sizes of valves used were 22, 23, 25, 26 and 27 mm; 25 mm valves were implanted in 50% of patients.

Pannus was observed in 10% patients and thrombus was observed in 50% patients. Most patients had gradients 45/20 mmHg across mitral valve. All patients were thrombolysed using streptokinase. In about 90% patient's, gradients decreased after thrombolysis (12/5 mmHg). The complications after thrombolysis were hemiparesis (4%), death before thrombolysis (6%) and death after thrombolysis (4%).

Patient Characteristics	N=50
Females (%)	60%
Mean age group (yrs.)	30-40
Shortness of breath (%)	80%
Palpitations (%)	20%
Tachycardia (%)	80%
Blood pressure $<100/70$ (%)	80%
Haemoglobin $<8$ gm% (%)	60%
Raised serum bilirubin (%)	46%
Raised urea and creatinine (%)	32%
International normalised ratio $<1.5$ (%)	26%
Mean duration after valve implantation (yrs.)	6

**Table 1. Baseline Demographics and Clinical Presentation of Patients with Stuck Valve**

Indications	N=50
Mitral stenosis (%)	60%
Mitral regurgitation (%)	20%
Aortic stenosis and aortic regurgitations (%)	10%
Mitral regurgitation and tricuspid regurgitation (%)	10%

**Table 2. Indications for Valve Replacement**

## DISCUSSION

The conventional strategy for management of prosthetic valve thrombosis has been thrombectomy or prosthesis replacement,<sup>11</sup> but it suffers a major limitation of high surgical mortality such that rates of mortality have been about 60%. The high mortality rates have led to increased usage of thrombolysis, which has been easy to implement, lower cost and is allied with lower mortality rates than surgery.<sup>12</sup> In present study, all patients with prosthetic stuck valve were managed with thrombolysis using streptokinase. Analogous to the existing literature, the main cause of complications in prosthetic valve in the patients included in our study was inadequate anticoagulation, i.e. 90% of patients showed in compliance with the medications. Previously, Kumar S et al, Reddy NK et al and Vasan RS et al have reported inadequate anticoagulant in 89.59%, 70% and 31.05% of patients, respectively, in their study on thrombolysis of stuck prosthetic valves.<sup>13-15</sup>

The duration between implantation of prosthetic valve and diagnosis of complications has been very variable. Some studies have reported it to be as less as about 10 days<sup>13</sup> after valve replacement to about 10 years after replacement.<sup>16,17</sup> A previous study has reported this duration to be 6.8 years (range 4 months to 17 years),<sup>12</sup> which is similar to our study, i.e. 6 years. Occurrences of early prosthetic valve thrombosis have been linked with a worse prognosis and considerably higher in-hospital mortality as compared to those with late incidence.<sup>18,19</sup>

Pannus formation was observed in 10% of patients in our study. A previous study reported about 25% of patients with pannus formation within the replaced valve,<sup>20</sup> whereas some studies have reported occurrence of pannus along with thrombus in more than 50% of patients.<sup>18</sup>

Thrombolysis has also been associated with some complications like hemiparesis, cerebrovascular accident, etc. In this study, the complications after thrombolysis were hemiparesis (4%), death before thrombolysis (6%) and death after thrombolysis (4%). Similarly, in another study, after thrombolysis, 2 patients died, one from cardiogenic shock and other from haemorrhagic stroke. Moreover, 5 patients died with the use of thrombolytics.<sup>18</sup>

Previously, Lengyel and Vandor compared the efficacy and safety of thrombolysis, surgery and heparin therapy in patients with prosthetic valve thrombosis and mortality rate was 5% after thrombolysis and 30% after surgery. In their study, thrombolysis appeared to be the optimal therapeutic choice for such patients.<sup>21</sup> Moreover, thrombolysis for prosthetic valve thrombosis with streptokinase and/or urokinase was found to be effective with a low risk of complications and a high rate of success in various Indian studies.<sup>14,15,22-27</sup> Various studies have also proposed that thrombolysis can be considered first-line treatment in all patients with prosthetic valve thrombosis unless any contraindications exist.<sup>28</sup>

## CONCLUSION

Considering these results, it can be concluded that prosthetic valves are seldom associated with some complications. Further, thrombolysis can be effective in patients with prosthetic valve thrombosis.

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