

Tricuspid Valve Replacement after Extensive Endocarditis Using Cormatrix® Extracellular Matrix

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Abstract

Tricuspid valve replace in patients with active endocarditis can be a challenging decision in surgical options. In this experience, we replaced the tricuspid valve using a handmade single tube of CorMatrix Extracellular Matrix (ECM) (CorMatrix Cardiovascular Inc, Roswell, Ga). Its showed to be safe and useful in a young patient with extensive valve destruction and early follow-up showed symptomatic resolution and valve normal function.

Keywords: Endocarditis; Tricuspid valve insufficiency; Heart valve disease

Introduction

Isolated tricuspid valve regurgitation secondary to infective endocarditis is most commonly associated intravenous drug abuse and the surgical options for treating are suboptimal [1]. Mechanical and bioprosthetic valves are subject to thrombosis or degenerative calcification, respectively [2,3].

Case Report

A 30-year-old man who was in jail, intravenous drugs abuse and multiple scars of cutting wounds in arms was attended in the hospital with 1-month history of fever, jaundice and commitment general condition. After several exams, the echocardiography showed a heterogeneous vegetation of 2.5 x 0.8 cm in anterior and septal leaflet of the tricuspid valve with moderate tricuspid regurgitation (TR) and normal left and right ventricular functions and dimensions. A thorax abdomen tomography scans showed small pulmonary abscess in lungs. Blood cultures were positive for *Staphylococcus aureus* methicillin susceptible and started intravenous cloxacillin. After a week of therapy, the patient was still in acute endocarditis, elevated C-reactive protein (CRP) and required norepinephrine. Blood cultures were still positive. A new echocardiography showed extensive valve destruction with vegetations (more than 4 cm. long) and severe TR (Figure 1).

We decided to intervene because of the size of the vegetations, continuous septic evolution and severe TR.

After standard cannulation, cardiopulmonary bypass and cardioplegic arrest, we observed a complete destroy of tricuspid valve



Figure 1: A: Tricuspid vegetation 42 mm. B: Tricuspid regurgitation due to endocarditis.



Figure 2: A: Vegetation in tricuspid valve. B: Vegetation in tricuspid leaflet.

with vegetations (Figure 2). The tricuspid leaflet and all vegetations were complete excised. No abscess was found. We used a 7 cm x 12 cm rehydrated piece of CorMatrix EMC to make a tube. This tube was suture using a 4.0 polypropylene, also 4.0 polypropylene suture to attached 1 cm strip for reinforced edge. This handmade tubular valve of CorMatrix ECM 33 mm diameter and 5 cm length was used to replace the valve. The distal end of this tube was tacked to the septal, anterior and posterior papillary muscles using 4.0 Polytetrafluoroethylene (PTFE) stiches and ECM pledget and the reinforced edge of the tube was sutured into the tricuspid valve annulus using two semicircunferential 4.0 uninterrupted polypropylene sutures. Cardiopulmonary bypass was resumed with no heart block and trans-esophageal echocardiography demonstrated a normal valve function with no residual TR. One month after surgery the transthoracic 3D echocardiography showed a complete normal valve function with no TR (Figure 3).

Discussion

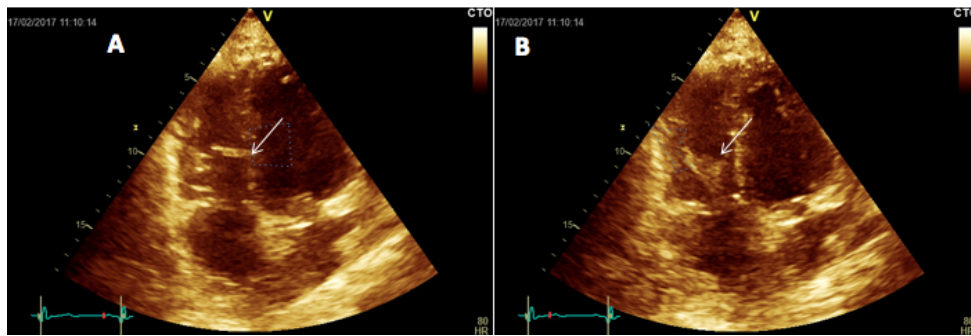
Isolated tricuspid valve regurgitation secondary to infective endocarditis is most commonly associated intravenous drug abuse and the surgical options for treating are suboptimal [1]. Mechanical and bioprosthetic valves are subject to thrombosis or degenerative calcification, respectively [2,3]. A conventional bioprosthesis would likely have limited durability in a man of this age, due to risk of calcification and eventual degeneration [4]. Mechanical tricuspid

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A: Diastolic Open cylinder tube (arrow signal). B: Systolic Close cylinder tube (arrow signal).

Figure 3: Four chambers transthoracic echocardiography.

valve replacement was not considered a good option because of the requirement of lifelong anticoagulation in a patient in jail with history of self-harm. Reinfection has been common in the context of the high recidivism rates among intravenous drug abuses [5].

CorMatrix is an extracellular matrix produced from porcine small intestine submucosa. It functions as an acellular bioscaffold for native tissue regeneration. Structural components include proteins (collagen, elastin), adhesion glycoproteins (fibronectin, laminin), glycosaminoglycans, proteoglycans, and matricellular proteins [6]. In both animals and humans, native tissue regeneration is reported to occur at 3 to 4 months after CorMatrix implantation [7,8]. The longer follow-up demonstrates CorMatrix to be devoid of significant inflammatory response or significant calcification [7-10].

Quarti and associates early experiences using CorMatrix for cardiac tissue repair shows effective and safety use in valve repair.

Clinical experiences with ECM as a surgical material has increased, and it has now been successfully used in a variety of clinical applications, including aortic annular enlargement, mitral valve repair, myocardial and intraventricular repair, pericardial reconstruction, and vascular repairs [11,12].

Conclusion

The first in-human ECM tricuspid cylinder reconstruction was performed by Wallen and Rao at Toronto General Hospital on november 3, 2011 [13]. Experience using CorMatrix in tricuspid valve active endocarditis repair has shown to be safe and present good functional results [6].

Gerdisch and associates present 19 tricuspid valve cylinder reconstructions, of the 19 patients, 11 had active and 5 had treated endocarditis. No death occurs, papillary attachment disruption was the principal complication in three patients and fungal infection occurs in one case. Follow-up data showed well-functioning tricuspid valves with no to mild regurgitation.

We believe that the develop of new bio-compatible materials to be

use in patients with active endocarditis will result in best durability and morbi-mortality outcomes.

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