Left Ventricular Pacing after Mitral, Tricuspid Valve Replacement without Interruption of Anticoagulation

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Pacemaker implantation for patients with mechanical tricuspid valve is quite challengeable because lead insertion through prosthetic tricuspid valve may cause valve dysfunction or lead impingement. Also complications due to interrupt of anticoagulation should be considered. A 65 years old woman received AAI (atrium paced, atrium sensed, inhibited) pacemaker for sick sinus syndrome and mechanical mitral valve replacement for severe mitral steno-insufficiency at the same time 16 years before. She needed to undergo mechanical tricuspid valve replacement (TVR) because of severe tricuspid regurgitation despite of medical therapy. Complete atrioventricular block developed during the TVR operation and it was not recovered even after several days of temporary pacing. We decided left ventricular pacing through coronary sinus because ventricular lead could not pass mechanical tricuspid or mitral valve and also planned to continue oral anticoagulation therapy. We could find a place where high pacing output did not pace phrenic nerve with acceptable sensing, pacing threshold. The patient recovered well without any periprocedural complications. Left ventricular pacing lead implantation through coronary sinus without interruption of anticoagulation can be an alternative to epicardial pacing for patients with mechanical tricuspid valve.

Keywords: Pacemaker; Tricuspid valve replacement; Anticoagulation

INTRODUCTION

Tricuspid valve operation carries high risk of developing complete atrioventricular block compared to aortic, mitral valve interventions [1-3], and pacemaker implantation in patients with mechanical tricuspid valve is troublesome. Bridging therapy with heparin is usually recommended for cardiac implantable electronic device in patients with mechanical valve. However, some case series reported that it was safe and feasible not to interrupt anticoagulation in this population [4]. We report a patient who underwent left ventricular (LV) pacing lead placement through coronary sinus for complete atrioventricular block after mechanical tricuspid valve replacement and already had mechanical mitral valve without interruption of oral anticoagulation therapy.

CASE REPORT

A 65-year-old woman was admitted to Chonnam National University Hospital due to worsening of dyspnea despite of medical therapy including diuretics, angiotensin converting enzyme inhibitor and beta blocker. She had history of mechanical mitral valve replacement 1 year after tissue valve operation for severe mitral stenosis and atrium paced, atrium sensed, inhibited (AAI) pacemaker for sick sinus syndrome 17 years before. Holosystolic murmur was heard at left lower sternal border. Chest X-ray showed cardiomegaly with cardiothoracic ratio of 0.7 and pulmonary congestion. Twelve-lead electrocardiogram showed cardiomegaly with cardiothoracic ratio of 0.7 and pulmonary congestion. Twelve-lead electrocardiogram showed AAI mode pacing but paroxysmal atrial fibrillation occurred on occasion at a rate of 90/min. Echocardiogram showed biatrial enlargement, good LV systolic function, well functioning mechanical mitral valve (valve area, 3.75 cm² by pressure half time; mean pressure gradient, 5.37 mm Hg; peak veloc-
ity, 1.85 m/sec), but more worsening of tricuspid regurgitation with coaptation failure. We decided tricuspid valve replacement (TVR; Trido TVR, Maze operation). Complete atrioventricular block occurred during operation probably due to atrioventricular node injury. It was not recovered even after 7 days of operation. Even though epicardial ventricular pacemaker could be used, we decided left ventricle pacing because of the possibility of severe adhesion and perioperative morbidity associated with surgeries. We also planned to continue oral anticoagulation therapy at international normalized ratio of 2.3 to 2.5 because the patient had mechanical mitral valve and paroxysmal atrial fibrillation. Cardiac computed tomography was done to find anatomical abnormality in coronary sinus. deflectable radiofrequency ablation catheter was engaged into coronary sinus and we performed angiogram in order to identify detailed anatomy and find appropriate vein. Atrial lead had acceptable sensing and pacing parameters and generator was upgraded from AAI to DDD (dual paced, dual sensed, dual response) mode (Identity ADx XL DC 5286; St. Jude Medical, St. Paul, MN, USA). A LV pacing lead (Quickflex 1258T, St. Jude Medical) was inserted through a lateral vein of coronary sinus (Fig. 1). Capture threshold of LV lead was 1.5 V at 0.4 ms, sensing threshold of 7 mV and pacing resistance of 730 ohm. Post-procedural electrocardiogram showed good dual chamber pacing with right bundle branch block pattern QRS complex (Fig. 2). The patient recovered from dyspnea after a few days of stays at coronary care unit and then was discharged without any other complication. Complications associated with continued oral anticoagulation including device-pocket hematoma did not occur.

DISCUSSION

Tricuspid valve replacement has been increased gradually, because the current evidence based recommendations emphasize proactive and aggressive repair of secondary tricuspid regurgitation concomitantly with mitral operations. Also, the needs for a pacemaker implantation after tricuspid valve operation are more common than other cardiac operation, because of the risk of damage to conduction system [3,5,6]. Valve damage and lead impingement may develop during implantation of ventricular pacing lead in patients undergoing TVR (especially mechanical valve). We chose LV pacing lead because the patient already had three times of operations and there were worries about severe adhesion and tissue inflammation. Bridging with heparin sometimes can carry short period of normal coagulation (even hypercoagulability related to the prothrombotic state of surgery) with an associated with thromboembolism or device-pocket hematoma [4]. Also, the risk of bleeding complication may be higher associated with use of epicardial pacing lead without interruption of anticoagulation.

LV pacing lead has been reported to have stable sensing, pacing threshold and favorable outcome. One study showed that LV lead revision rate due to capture failure were 6.3% at 6-month and 9.4% at 2-year follow-up. Also, serious complications such as diaphragmatic pacing, coronary sinus perforation, LV lead-related infections requiring lead revision were rare [7]. It is similar to results of other studies, LV lead implantation was successful with high probability and complications such as lead dislodgement, extracardiac stimulation, infection were not common [8,9].

In conclusion, the LV pacing lead implantation through coronary

Fig. 1. Fluoroscopic images during pacemaker implantation. (A) Coronary sinus venogram at right-anterior oblique view. (B) The antero-posterior view of mechanical mitral valve, tricuspid valve, right atrial, and left ventricular pacing lead in lateral branch of coronary sinus.

Fig. 2. Electrocardiogram after DDD (dual paced, dual sensed, and dual response) pacemaker implantation.
sinus in a patient with dual mechanical valve replacement (mitral and tricuspid value) was feasible and safe without interruption of oral anticoagulation. Therefore, this approach can be a good alternative for patients who need pacemaker with mechanical tricuspid or other valves.

REFERENCES