

Permanent pacing across a tricuspid bioprosthesis

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A 37-year-old woman was admitted having suffered progressive swelling in her face, feet and abdomen for 3 months. On examination, she displayed features of right heart failure and was instituted on optimal pharmacotherapy with Diuretics, Digoxin, ACE inhibitors and Beta blockers. However, she continued to remain in a fluid overloaded state.

She had previously suffered from rheumatic heart disease and had undergone mitral and tricuspid valve replacement with mechanical valves in 2006 (25 and 27mm Chitra valves). An epicardial lead with permanent pacemaker implantation was done at the time of surgery for concomitant atrial fibrillation with complete heart block. Subsequently, she had to be thrombolysed for a stuck tricuspid prosthesis the following year (2007). Three years later (in 2010) epicardial lead revision, along with pulse generator replacement, was done for high lead impedance with battery drain.

Echocardiography at admission revealed a normally functioning mitral prosthesis with an increased gradient across the mechanical tricuspid prosthesis (Max: 26mmHg, Mean: 15mmHg). There was marked enlargement of the right (73 x 62mm) and left atrium (56 x 72mm) with good biventricular function.

In view of these findings, along with refractory right heart failure, she was subjected to redo tricuspid valve replacement with a

bioprosthetic tricuspid valve (BTV) using a 25mm Carpentier Edward Perimount valve. Also, the epicardial lead threshold was found to be greater than 5 Volts with end of life of pacemaker. Hence it was decided to implant an endocardial lead across the BTV. This lead was screwed onto the mid septum to ensure stability (Figure 1a, b) and was connected to a pulse generator (Medtronic Sigma VVIR mode). The lead threshold and resistance were 0.7 Volts and 464 Ohms respectively. Post procedure echocardiography revealed normally functioning BTV with no regurgitation. Following this there was a dramatic improvement in heart function over the next few days. She was discharged after one more week of medical stabilisation with optimal pharmacotherapy. She has been asymptomatic during follow up at 1 and 3 months with no features of heart failure. Pacing parameters have also remained stable.

Epicardial lead placement is associated with the development of high threshold and requires limited thoracotomy.⁽¹⁾ In the presence of a dilated right atrium, lead handling across the tricuspid valve can be troublesome. Delivery systems consisting

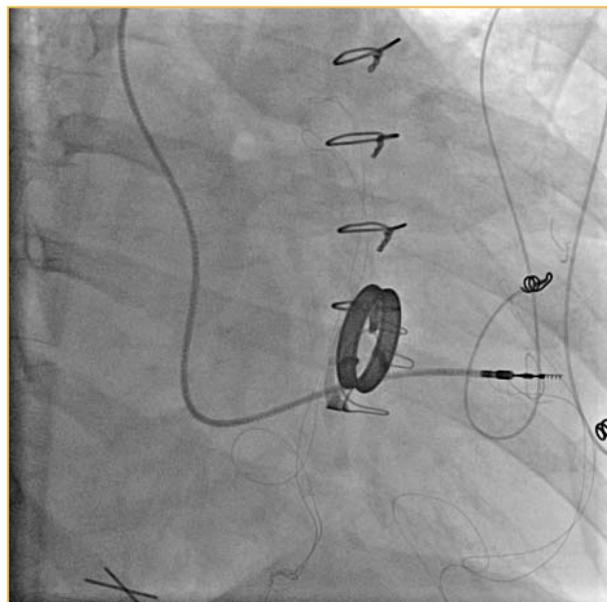


FIGURE 1a: Fluoroscopic right anterior oblique view showing endocardial pacing lead across the bioprosthetic tricuspid valve, mechanical mitral valve and 2 epicardial leads.

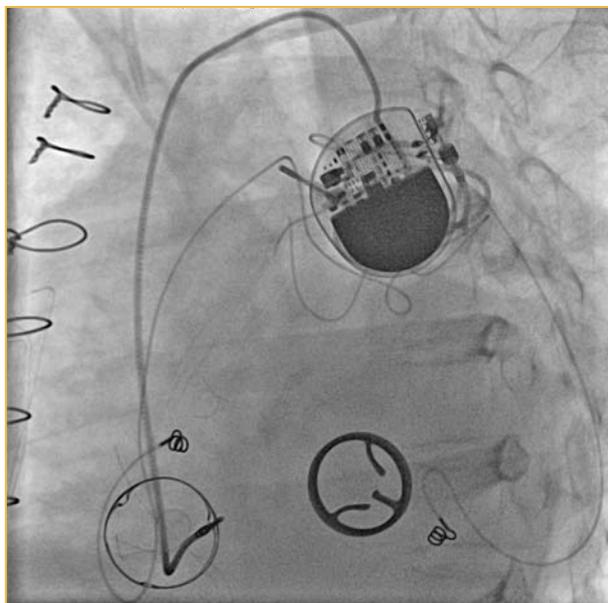


FIGURE 1b: Fluoroscopic left anterior oblique view showing endocardial pacing lead across the bioprosthetic tricuspid valve with pulse generator, mechanical mitral valve and 2 epicardial leads.

of steerable catheters have been described to overcome this issue.⁽²⁾ Insertion of endocardial leads across the prosthetic tricuspid valve may damage the prosthesis.⁽³⁾

Endocardial pacing through the coronary sinus is a viable option.^(4,5) Current opinion would probably favour this approach and pacing of the left ventricle as the most preferred option. The use of the coronary sinus for intraoperative pacemaker lead implantation in patients with tricuspid valve prosthesis was first described in 1970.⁽⁶⁾ Bai, et al. first reported permanent transvenous left ventricular pacing via the great cardiac vein.⁽⁷⁾ The same method has been used successfully in patients with complex congenital heart disease requiring pacing.⁽⁸⁾ However, diaphragmatic stimulation, lead displacement and coronary sinus dissection may rarely occur. It provides effective ventricular stimulation and a stable position in the tributaries of the coronary sinus is most often achieved.

CONCLUSION

These images illustrate some of the options and problems facing a patient with a prosthetic tricuspid valve who requires

pacing. The epicardial leads bear testament to the fact that epicardial pacing is not a good long-term solution for these patients. The case illustrates that endocardial pacing through the prosthesis is a feasible alternative. In the era of cardiac resynchronisation therapy, the available technology and expertise has made endocardial pacing through the coronary sinus the preferred option.

Conflict of interest: none declared.

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