

# TRICUSPID PROSTHESIS MALFUNCTION UNMASKED BY EXERCISE STRESS ECHOCARDIOGRAPHY

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## Abstract

*Exercise echocardiography is used mainly in the study of patients with coronary artery disease, however the technique is increasingly used in the study of other pathologies.*

*We present the first case of use of exercise stress echocardiography for clinical decision in one patient with biological prostheses in tricuspid position.*

*The clinical exam, the echocardiogram, the cardiac MRI, the NT proBNP were normal and the patient has been considered to have no indication for surgery.*

*The patient was only presented and accepted for surgery after the results of exercise stress echocardiography.*

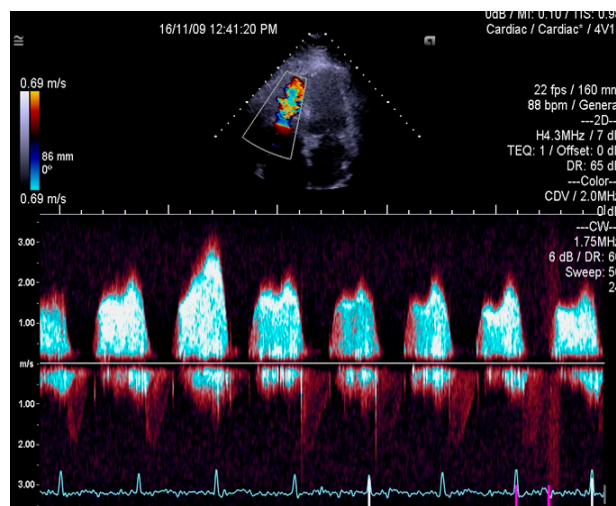
## CASE REPORT

We describe the case of a 52 years-old Caucasian male, member of the Portuguese army that at 30 years age, has a motorcycle accident with chest trauma with a long stay in Hospital. He also is athlete with at least six-hour weekly training schedule that competes in marathon and half marathon frequently. Since four years ago he refers to be unable to increase speed when running after the first four kilometers of competitions. He went medical evaluation and severe tricuspid regurgitation and right ventricular and atrial dilation was noted. After complete study, he has been submitted to cardiac surgery and a biologic prosthesis (St Jude Medical Epic 29) was given in tricuspid position.

After recovery right ventricle became normal with normal ventricular function and the echocardiogram reveals tricuspid mean gradient of 5 mmHg, however the patient is unable to walk more than 200 meters without extreme fatigue.

An echocardiogram and an MRI were done and were considered normal. Blood levels of NT- proBNP were also normal.

Physical examination revealed normal cardiac auscultation and normal radial, carotid and femoral pulses. The rest echocardiogram, done in orthostatic position, reveals a tricuspid mean gradient of 6 mmHg. (Figure 1) The patient was referred then to Hospital da Cruz Vermelha for Treadmill exercise echocardiography that was performed following the modified Bruce protocol (6 minutes)



**Figure 1**

*In this figure we can see the tricuspid mean gradient (6 mmHg) evaluated in orthostatic position in the treadmill before start exercise.*

and an huge increase in mean gradient was seen (Figure 2) A mean gradient of 22 mmHg was attained (Increase of 16 mmHg). We suggest that substitution of tricuspid prosthesis should be considered. Some months later tricuspid prosthesis was substituted – a huge amount of pannus was seen - and exercise stress echocardiogram was done with increase of tricuspid mean gradient from 4 mmHg to 10 mmHg and a duration of 14 minutes (modified Bruce Protocol). The patient feels normal again.

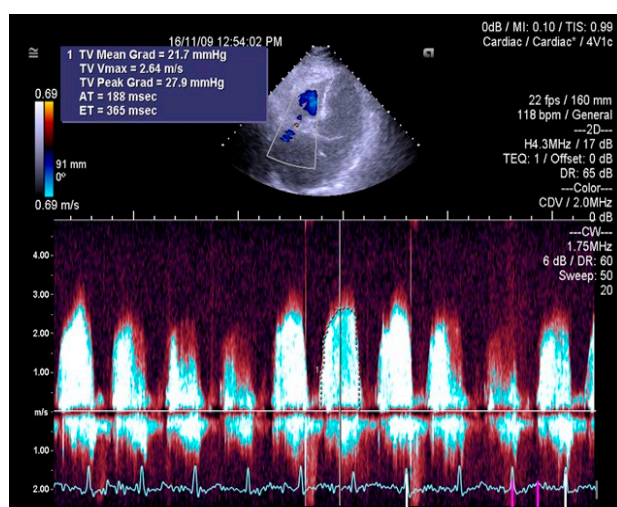


Figure 2

In this figure we can see the tricuspid mean gradient (22 mmHg) evaluated at peak exercise before stop exercise. (variation of 16 mmHg in tricuspid prosthesis mean gradient and huge variation of mean gradient associated with respiratory movements.)

## DISCUSSION

A significant part of the patients with aortic valve disease and mitral valve disease that are submitted to surgery are given a prosthesis.<sup>1,2</sup> Most prosthetic valves are inherently stenotic,<sup>3,4</sup> being the effective orifice area some times too small in relation to body surface, a phenomenon classified as valve prosthesis-patient mismatch.<sup>5</sup> In clinical practice, it is common that normally and abnormally prostheses can produce similar gradients at rest and exercise stress echocardiography may be valuable in confirming or excluding the presence of prosthetic valve dysfunction or mismatch. This is particularly true when we have disagreement between symptoms and the hemodynamic profile evaluated by Doppler echocardiography at rest.<sup>5-8</sup> According to Picano<sup>3,4</sup> a disproportionate increase in trans-valvular mean gradient (greater than 20 mmHg for aortic prosthesis or greater than 10 mmHg for mitral prosthesis) generally indicates severe prosthesis dysfunction or mismatch. To the best of our knowledge this is the first case of tricuspid prosthesis mismatch demonstrated with exercise stress echocardiography. The most recent recommendations (3) make no reference to tricuspid prosthesis patient mismatch however using the criteria used for mitral prosthesis evaluation with stress echo encourages us to assume that this is the case of our patient.

We use exercise stress echocardiography in patients with prosthesis whenever there exists discrepancy<sup>9,10</sup> between the gradients evaluated in the echocardiogram and the presence of the symptoms. Evidence based cut-off gradients are needed for clinical decision. Until there we associate the exercise Doppler parameters with the clinical and the exercise test data for decision.

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