Obstructive Prosthetic Mitral Valve Thrombosis Successfully Thrombolysed with Low-Dose Ultra-Slow Infusion of Tissue Plasminogen Activator

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Prosthetic valve thrombosis (PVT) is one of the major causes of posthetic heart valve failure. Treatment modalities for this rare but life threatening complication include anticoagulation with heparin, thrombolytic therapy (TT) and re-do valve surgery. Guidelines lack definitive class I recommendations due to lack of randomised controlled trials, and usually leave the choice of treatment to the clinician’s experience. Surgery is suggested as a first line strategy in most situations of left sided PVT; however, TT has been recently used with successful outcomes¹⁻³. This report describes a patient with giant thrombus located on the prosthetic mitral valve, which was successfully treated with ultra-slow infusion (25 hours) of low dose (25 mg) tissue plasminogen activator (tPA) under the guidance of two-dimensional (2D) and real-time three-dimensional (RT-3D) transesophageal echocardiography (TEE) and fluoroscopy.

A 57 year-old woman who had undergone mechanical mitral valve replacement (29 mm Sorin) 5 years earlier was admitted...
to our institution with NewYork Health Association (NYHA) functional class 3 dyspnea and palpitation existing within the past 2 weeks. Physical examination was unremarkable with a blood pressure of 110/80 mmHg and a pulse rate of 117 beats/ min with an irregular rhythm. She had no other complaints and no history of previous stroke. Electrocardiography showed atrial fibrillation with rapid ventricular response. International normalized ratio (INR) was subtherapeutic (1.2). Transthoracic echocardiography (TTE) revealed increased mitral transvalvular gradients of 29/15 mmHg with a decreased mitral valve area of 0.9 cm². Subsequently 2D TEE was performed which demonstrated a giant mobile thrombus located on the mitral prosthetic valve (Fig. 1A) and RT-3D TEE clearly demonstrated the huge thrombus obstructing the mitral inflow (Fig. 1A'). Right anterior oblique caudal fluoroscopy provided a side (pivot) view with the disks parallel to the x-ray beams showing one leaflet fixed in closed position and the other with a restricted slight motion (Fig. 1A'). There was no contra-indication for TT and TT was therefore immediately started after taking informed consent of the patient. The TT protocol consisted of repeated sessions of low-dose (25 mg), ultra-slow infusion (25 hours) of tPA without bolus and six hours of heparin infusion between the sessions as reported previously. After the first TT session TTE revealed a minimal decrease in transvalvular gradient of 24/13 mmHg with an increased mitral valve area of 1.1 cm². Repeated 2D and RT-3D TEE showed a decreased thrombus burden on the prosthesis (Fig. 1B and B'). There was a mild relaxation in motion of restricted leaflet but the other leaflet was still stuck on fluoroscopy (Fig. 1B'). Upon these findings a second session of TT was performed without any complication. The thrombus burden decreased significantly on 2D and RT-3D TEE (Fig. 1C and 1C') and there was a slight movement in the stuck leaflet on fluoroscopy (Fig. 1C''). Subsequently a third session of TT resulted in complete thrombolysis of the thrombus on 2D and RT-3D TEE (Fig. 1D and 1D') and normalisation of leaflet motions on fluoroscopy (Fig. 1D''). There was no evidence for a thromboembolic or hemorrhagic complication. The patient was discharged under therapeutic oral anticoagulation.

Discussion

One of the most life-threatening complications of mechanical prostheses is valvular obstruction by thrombus. The treatment of choice for mechanical valve obstruction was surgery until 1990s. Over the last decade, TT has been increasingly used and has become an alternative to surgery as the first line of therapy in patients with thrombosed mechanical valves.

We have previously reported that repeated doses of low-dose (25 mg) and slow infusion (6 hours) of tPA under the guidance of serial TEE was superior to faster infusion and/or higher dose protocols or Streptokinase. This protocol provided excellent results even in pregnant patients with PVT. In addition, we have very recently reported that ultra-slow (25 hours) infusion of low dose (25 mg) tPA without bolus appears to be associated with quite low complications and mortality for PVT patients without compromising post-thrombolytic success except for those with NYHA class IV.

Although TTE examination is an essential part of diagnostic assessment of a patient with prosthetic valve, the value of TTE is usually limited because of a certain degree of acoustic shadowing and characteristic reverberations caused by the prosthetic material itself. On the other hand 2D TEE with its high resolution may differentiate thrombus from pannus formation and vegetation in PVT patients. RT-3D TEE also has an indispensable value to assess thrombus size, mobility and location which may help in decision making, such as thrombolysis, anticoagulation and surgery. Fluoroscopy provides valuable data with regard to leaflet mobility and is complementary to TEE which is an essential guide for TT especially in patients with right sided PVT.

As a result we can conclude that low-dose and ultra-slow infusion of tPA is a valuable alternative treatment regimen for prosthetic heart valve thrombosis. TEE and fluoroscopy are complementary to each other for TT guidance in PVT patients.

Statement of ethical publishing

The authors state that they abide by the statement of ethical publishing of the International Cardiovascular Forum Journal.

Data sharing

No additional data

Contributorship

All of the authors contributed to the planning, conduct, and reporting of the work. All contributors are responsible for the overall content as guarantors.

Funding

No funding.

Competing interests

All of the authors have no conflict of interest.

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DOI: 10.17987/icfj.v2i1.4.

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ISSN: 2410-2636 © Barcaray Publishing