

Successful fibrinolytic treatment in an old patient with acute aortic prosthetic thrombosis

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Thrombosis of mechanical heart valve prosthesis is a rare fatal complication after heart valve replacement. This report describes an old female patient with aortic prosthetic valve thrombosis who had a successful fibrinolytic treatment.

Thrombosis is a well-known fatal complication of prosthetic mechanical heart valves, with an incidence of 0.03 to 4.3% per patient year, and varies depending on the location of prosthesis (most frequent in tricuspid, less frequent in mitral and aortic positions).¹ The surgical operation has been the traditional management strategy for prosthetic valve thrombosis (PVT). However, mortality rate is high during surgery, depending mainly on patient's functional status. Fibrinolytic treatment is an alternative therapy to surgery and is considered a first-line treatment of choice for right-sided PVT.² However, because of the high risk of cerebral thrombo-embolism, the use of fibrinolytic therapy for left-sided PVTs remains controversial and only reserved for surgically high-risk patients. We hereby present the case of an old woman with pulmonary oedema in whom transthoracic echocardiography (TTE) revealed thrombosis of aortic prosthetic valve.

Case report

An 82-year-old woman presented with a 1 week history of dyspnoea, which had progressively worsened for the last 3 days. She had undergone aortic valve replacement for severe stenosis with a bi-leaflet St Jude mechanical heart valve prosthesis 10 years ago. On admission, the patient was dyspnoeic and orthopnoeic at rest. She did not have angina, palpitation, or fever. She had non-productive cough for 1 week. Her medical history revealed that she had type 2 diabetes mellitus, hypertension, and thrombotic

stroke 2 years ago. Her drug treatment includes insulin, oral antidiabetics, angiotensin-converting enzyme-inhibitor, aspirin, and oral anticoagulant (warfarin sodium). However, she did not use warfarin regularly for the last weeks. In physical examination, blood pressure was 150/90 mmHg and heart rate was 110 bpm. She was dyspnoeic and tachypnoeic. Auscultation of the chest revealed moist rales from base to mid-zones of each lung. Heart auscultation revealed 2/6 systolic murmur at aortic area and 3/6 grade early-diastolic murmur at left parasternal border. Her electrocardiogram showed sinus tachycardia and non-specific intraventricular conduction delay. Chest radiography demonstrated pulmonary congestion. Her complete blood count showed anaemia (Hb: 11.2 g/dL). The international normalized ratio (INR) was low (1.3) (target range 2.5–3.5). The results of other haematological, blood chemistry, and cardiac enzyme analyses were within normal limits.

Transthoracic echocardiography with spectral Doppler recording of transvalvular blood flow was performed using a Vivid Five instrument (GE-Vingmed Ultrasound AS, Horten, Norway) with a multifrequency transducer. Transthoracic echocardiography revealed normal left and right ventricular dimensions. Left ventricular ejection fraction was found to be normal. An obstructive thrombus was seen in aortic mechanical valve (*Figure 1*). The pressure gradient across aortic valve was 80 mmHg (peak)/45 mmHg (mean). A 2–3/4 grade aortic insufficiency was recorded. Transoesophageal echocardiography (TEE) was planned, but the patient did not tolerate the procedure and she refused to do so.

On the basis of clinical and echocardiographic findings, the surgery was planned for the patient, but she refused

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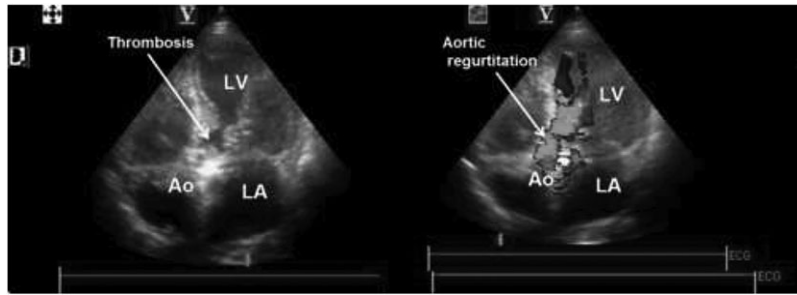


Figure 1 Transthoracic echocardiographic apical view of the thrombus formation on the prosthetic aortic valve and aortic regurgitation. Ao, aorta; LA, left atrium; LV, left ventricle.

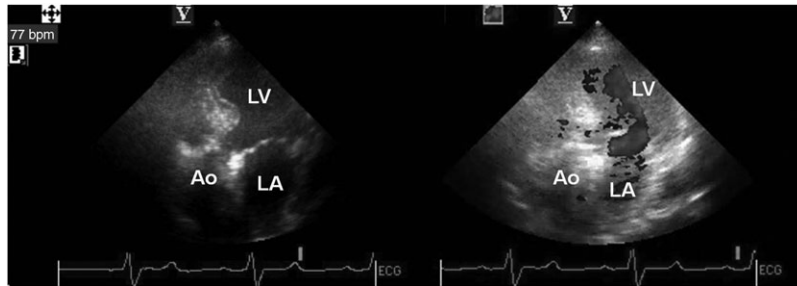


Figure 2 Transthoracic echocardiographic apical view of prosthetic aortic valve after successful fibrinolytic treatment. Ao, aorta; LA, left atrium; LV, left ventricle.

the surgery. Then streptokinase at a starting dose of 250 000 U was given for 1 h, followed by continuous infusion at a rate of 100 000 U/h for the next 24 h. Twelve hours after initiation of fibrinolysis, the patient's dyspnoea began to resolve. After completion of fibrinolytic treatment, she was quite normal without any complaints. Control TTE revealed the resolution of thrombosis, and the pressure gradient was found to be 30/12 mmHg (peak, mean) (*Figure 2*). The patient was discharged from the hospital in good clinical condition. Oral anticoagulation with warfarin sodium with target INR values of 2.5–3.5 and concomitant use of aspirin at a dosage of 100 mg/day was strongly recommended to the patient.

Discussion

Thrombosis is a major complication after prosthetic heart valve replacement, leading to an increased morbidity and mortality. Although new valve designs and progress in operating techniques have improved the results of valve replacement surgery, thrombo-embolic complications remain as an important issue, mostly because of inadequate anticoagulant therapy. The incidence of PVT can be as high as 13% in the first year in any valve location and even can be 20% for tricuspid valve position.³ The incidence of left-sided PVT varies between 0.5 and 6% per patient-year.⁴

Emergent or urgent surgery has been the traditional treatment of choice for mechanical valve thrombosis, depending on the clinical status of the patient for many years. However, the mortality rate associated with valve surgery can be as high as 69%, varying with the functional status of the patient.⁵ That is why new alternative therapeutic strategies, such as fibrinolytic treatment, become promising modality. However, there are no randomized trials comparing the results of surgery with fibrinolysis in PVT. Vitale *et al.*⁶ compared the results of surgery with

thrombolysis in 28 patients, of which 20 had surgical treatment, with 1 death. Eight cases (seven mitral and one aortic prosthetic thrombosis) were treated with fibrinolytic therapy and all responded well without deaths or neurological complications. The authors of this small, uncontrolled study reported that thrombolysis was effective in selected patients. There is general agreement on the indications for fibrinolysis in patients with right-sided heart valve thrombosis, because the success rate is especially high and the risk of cerebrovascular accident absent.⁷ There is no such consensus in cases of PVT in the mitral and aortic positions. Fibrinolytic treatment for the left-sided PVT has been recommended to critically sick patients with functional class III or IV, and high surgical operative risk as class IIb recommendation (level of evidence: B) by ACC/AHA.⁷ Lengyel *et al.*⁸ reported the results of more than 200 published reports of left-sided prosthetic valve fibrinolysis showing an 82% initial success rate, a stroke rate of 5–10%, with 6% death, 5% major bleeding, an overall thrombo-embolism rate of 12 and 11% of recurrent thrombosis. Roudaut *et al.*⁹ reported their centre study of 127 instances of PVT treated with fibrinolysis over 22 year period. Complete resolution of haemodynamic abnormalities was observed only in 70.9% of cases, and the mortality was reported to be 11.8%. Other studies also showed similar results for fibrinolytic treatment in patients with PVT.^{10–12} A meta-analysis including 515 cases reported an initial success rate of 84%, a mortality of 5%, bleeding complications in 3%, and systemic embolism in 9%.¹³

The most important complications of fibrinolytic therapy are thrombo-embolic events and haemorrhage. Intracranial haemorrhage deserves special mention, as it is one of the most severe and feared complications of fibrinolytic therapy. The incidence of cerebral haemorrhage has been widely evaluated in large multicentre trials of fibrinolytic treatment of acute myocardial infarction and found to be

<1%. In studies of thrombolytic therapy for PVT, the cerebral haemorrhage rate fluctuated between 0 and 3%.^{13,14} Older age is an important risk factor for intracranial bleeding.¹⁵ Although the elderly constitute a minority of the general population, they are the fastest growing segment of the population. All studies mentioned above included patients who were younger than 80 years of age. The decision to use fibrinolytic therapy in older patients should be based on an estimate of the patient's underlying risk without treatment, the expected benefit of the treatment, and the risk of the therapy. In general, the higher the underlying risk, the more benefit that can be gained. Our patient, who is 82 years of age, is a good example of successful fibrinolytic treatment for aortic PVT and shows the efficacy of this therapy in older patients who were not included in most of the PVT registries.

Transthoracic echocardiography is the most widely used diagnostic tool in patients with suspected PVT.¹⁶ However, TEE can provide more accurate images than TTE and, when available, is the best diagnostic tool to determine alterations in the occlusive mechanism or the existence of valvular thrombotic masses. In addition, TEE may clearly show the restricted prosthetic valve motion and the size, location, and mobility of the thrombosis. However, TEE is a semi-invasive technique, and it may be difficult to perform in old patients, especially serial TEE examinations are needed to evaluate the response to treatment. In these conditions, transprosthetic pressure gradients can be easily estimated by TTE Doppler examination. In addition, TTE can also detect an altered flow pattern suggestive of intrinsic prosthetic failure, alterations in the mobility of the occlusive system, or the presence of a thrombotic mass adherent to the prosthesis. The relief of haemodynamic obstruction by thrombolysis can also be monitored simply by transthoracic Doppler echocardiography.

Conclusion

Prosthetic valve thrombosis is one of the most serious complications of a mechanical heart valve. Fibrinolytic therapy is effective in PVT. This case is an example of successful fibrinolytic treatment in an old female patient with aortic PVT, showing the effectiveness of this type of treatment in high-risk patients.

Conflict of interest: none declared.

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