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BRIEF COMMUNICATION

Thrombolytic Therapy as the Management of Mitral Transcatheter Valve-in-Valve Implantation Early Thrombosis

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A 70-year-old male underwent mitral transcatheter valve-in-valve implantation for a failed bioprosthesis implanted 11 years earlier. In the first days following the procedure, he developed thrombosis of the new bioprosthesis with restricted cusp motion. The transmitral mean gradient increased significantly despite effective anticoagulation therapy using unfractionated heparin infusion. Low dose and slow infusion of alteplase resulted in resolution of the thrombus and normalisation of cusp motion. Thereafter long-term anticoagulation using a vitamin K antagonist was instituted and the patient remained asymptomatic.

Keywords Mitral bioprosthesis • Valve-in-valve • Transcatheter • Thrombus • Thrombolytics

Introduction

Valve thrombosis (VT) of prosthetic mechanical valves is a life-threatening complication most often related to subtherapeutic oral anticoagulation (OAC) therapy. Its incidence is lower in bioprosthesic valves and there is limited data regarding the management of VT in bioprosthetic aortic [1] and mitral [2] valves. Here we present a case of a mitral transcatheter valve-in-valve implantation (mTVIVi) thrombosis early after the procedure, which was successfully managed using thrombolytic therapy.

Case Presentation

A 70-year-old morbidly obese male (BMI 43) with a history of coronary artery bypass grafting and mitral valve (MV) replacement (Hancock II porcine bioprosthesis size 29, Medtronic, Inc, Minneapolis, MN) performed 11 years earlier presented with class III heart failure symptoms. He was in normal sinus rhythm. Transthoracic echocardiogram (TTE) showed degenerative MV prosthesis with moderate to severe intravalvular regurgitation. Left ventricular end-diastolic diameter (LVEDd) was 56 mm and ejection fraction (EF) was 50%. Operative risk was deemed to be high with a Society of Thoracic Surgeons (STS) score of 19.13%. The consensus of our multidisciplinary team was to proceed with mTVIVi. A SAPIEN XT (Edwards Lifesciences, Irvine, California) size 29 mm prosthetic valve was successfully implanted (Figure 1, Panel A,B,C&D) using the transapical approach. A post-procedural transoesophageal echocardiogram (TEE) showed a well-seated valve in the mitral position with no residual paravalvular or intraprosthetic regurgitation, a mean gradient (MG) of 2 mmHg, a systolic pulmonary artery pressure (sPAP) of 35 mmHg and a normal cardiac index of 2.9 L/min/m^2. The patient was initiated on daily aspirin 81 mg, metoprolol 25 mg, and enoxaparin 40 mg subcutaneously. Clopidogrel 75 mg daily was initiated the following day as per our protocol. At day 1 post procedure, a

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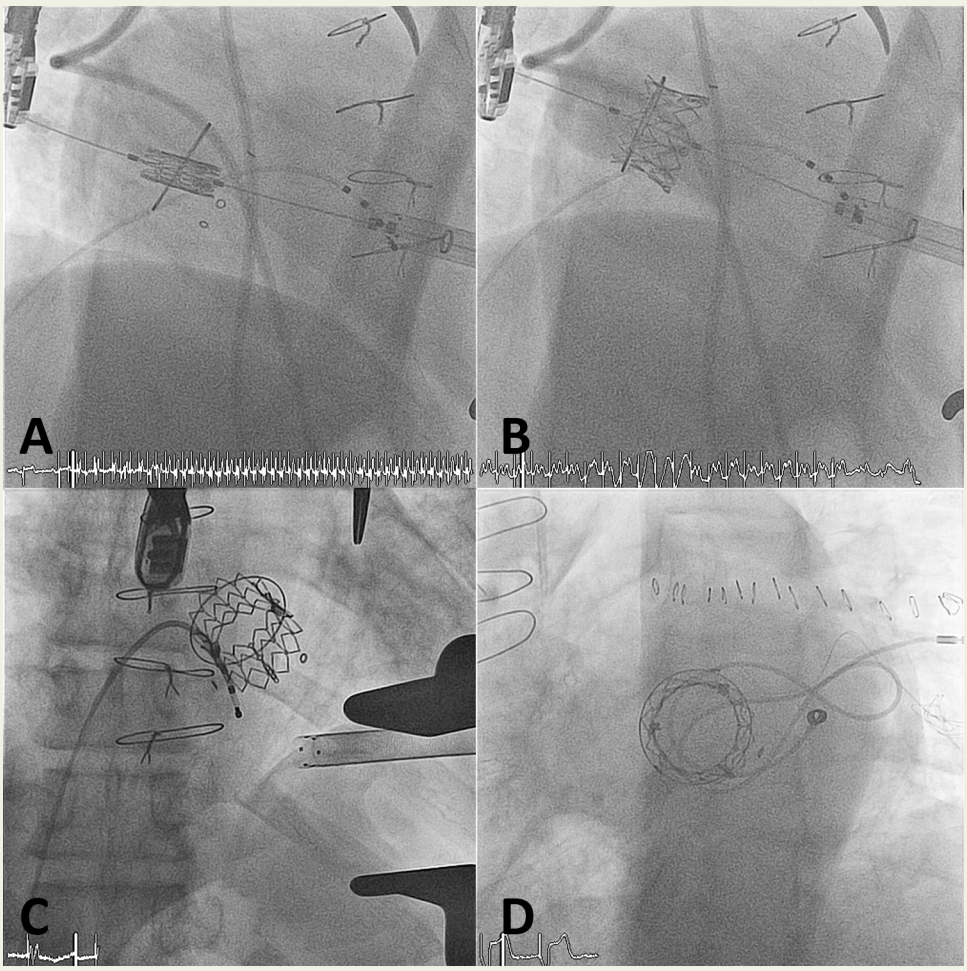

Figure 1 Fluoroscopy showing the mitral transcatheter valve-in-valve implantation (mTVIVi) through the apical approach. **Panel A-** Positioning of the mTVIV inside the pre-existing bioprosthetic valve; **Panel B-** Inflation of the mTVIV during rapid ventricular pacing; **Panel C & D-** Optimal seating of the TVIV within the mitral bioprosthesis.

TTE showed a transmitral MG of 4 mmHg at a heart rate (HR) of 67 beats/min (bpm), a LVEDd of 54 mm, an EF of 55% and no pathological mitral regurgitation (MR). At day 2, 3 and 6, follow-up TTE studies showed transmitral MG of 9, 6 and 14 mmHg, respectively at similar HR. Colour Doppler demonstrated abnormally turbulent flow across the MV prosthesis. A follow-up TEE demonstrated a thrombus on the ventricular aspect of the MV prosthesis with restricted motion of the cusps and evidence of new intraprosthetic MR (Figure 2, Panel A&B; Videos 1&2). The patient remained haemodynamically stable and asymptomatic. Thereafter unfractionated heparin (UFH) infusion was initiated at day 7 to maintain an activated partial thromboplastin time (aPTT) ratio of 2-2.5 times control. The dose of metoprolol was as well increased to 100 mg and subsequently to 200 mg daily. Despite these measures, the transmitral MG further increased to 19 mmHg on day 8 and sPAP increased to 50-55 mmHg. Thereafter alteplase infusion was initiated at 10 mg/hr without a bolus. After six hours of infusion, the transmitral MG decreased to 10 mmHg and sPAP dropped to 40 mmHg. At eight hours of infusion, the transmitral MG decreased to 5 mmHg with resumption of laminar blood flow across the MV and improved cusp motion. Due to the development of heparin-induced thrombocytopenia, UFH was replaced by argatroban followed by bridging with warfarin. A follow-up TEE at day 8 showed complete resolution of the thrombus and normal MV cusp motion (Figure 2, Panel C&D; Videos 3&4). The patient was discharged on aspirin and warfarin and remains asymptomatic two years later.

Discussion

Due to favourable clinical results, advances in transcatheter valve implantation and lack of long-term requirement for anticoagulation therapy, bioprostheses have gained momentum over mechanical prostheses as valve substitutes in patients with valvular heart disease [3]. Transcatheter valve-in-valve implantation has emerged as a promising complementary therapeutic option in high-risk patients requiring