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Case Report

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Immediate Thrombosis of Left Main Stem after Aortic Valve Replacement Running head: Left main Thrombosis after AVR

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Abstract

We describe a clinical case of 73-year-old woman with severe aortic stenosis and no coronary artery disease, who underwent elective aortic valve replacement with a stented pericardial tissue prosthesis. The presence of paracommissural slit-like coronary ostia was noted as an occasional anatomic abnormality on the surgical inspection of the aortic root. The patient presented ventricular tachycardia episode during the transfer to the intensive care unit. Upon an emergent re-sternotomy, occlusive thrombosis of the left main stem was revealed. The stented aortic valve prosthesis was replaced by a stentless pericardial valve. The postoperative course was uneventful.

Keywords: Aortic Valve; Acute Coronary Thrombosis; Replacement; Stentless Biological Heart Valve Prosthesis

Introduction

Acute intra operative coronary artery thrombosis is rare in cardiac surgery. We describe an unusual case of acute intraoperative coronary artery thrombosis in a patient operated on for aortic valve stenosis.

Case report

A 73-year-old woman with severe aortic stenosis was admitted to our department for elective Aortic Valve Replacement (AVR). She was symptomatic for the II functional class dyspnea by New-York Heart Association and reported a previous syncope. She was hypertensive and had no other significant comorbidities, but family history of coronary artery disease. The coronary angiography showed normal coronary arteries. The procedural risk estimated by logistic Euro SCORE was 3.3. In the remote clinical history, bilateral orthopedic operation on art. humeri, nephroptosis, degenerative lumbar discopathy and osteochondrosis complicated by stenos is of the vertebral canal were noted. She underwent elective cardiac surgery - AVR with a 21 mm Edwards Life sciences Perimount Magna pericardial tissue prosthesis. The operation was performed via median sternotomy. After the institution of Cardiopulmonary Bypass (CPB), the aorta was cross-clamped and the heart was arrested with a single dose of hyperkalemic warm blood cardioplegia, administered through a cannula into the aortic root. The subsequent doses of cardioplegic solution were administered retrogradely through the coronary sinus, every 15 minutes. At surgical inspection, the presence of paracommissural slit-like coronary ostia was noted as an occasional anatomic abnormality. The native aortic valve was removed by excision, and the aortic annulus was sized. A 21 mm supra-annular Edwards Life sciences Perimount Magna tissue prosthesis was implanted following a usual technique, with interrupted Teflon pledgetted 2/0 Ethibond (Ethicon, Edinburgh, Scotland) mattress sutures. Before closing the aortotomy incision, the coronary ostia were carefully inspected with the prosthesis in place. The patient was easily weaned from CPB with normal haemodynamics and no inotropic support. In order to exclude any potential hemodynamic compromise related to the particular anatomy of the coronary ostia, epicardial Doppler flowmetry control was performed on both coronary arteries and did not show any abnormality. Normal flow pattern by transesophageal Doppler ultrasound was present in the left main stem (Video 1).

While the patient was being prepared to transfer to the intensive care unit, progressive arterial hypotension followed by Ven-

tricular Tachycardia (VT) suddenly developed.

Emergent re-sternotomy and CPB re-commencement were performed during resuscitation. The heart was re-arrested with a single dose of retrograde warm blood cardioplegia, and the aortotomy was reopened. As intraoperative finding, occlusive thrombosis of the left main stem was revealed. The thrombus was removed delicately by gentle traction, and repeated retrograde blood cardioplegia was administered to prevent eventual distal embolization. Though both the coronary ostia were patent, and the previously implanted bioprosthesis seemed well-positioned and macroscopically intact, we decided to replace the latter with a 21 mm stentless Sorin Freedom Solo pericardial valve. This choice was opted for in the hypothesis that a small space available between the prosthesis sewing ring and the abnormally low coronary ostia could be insufficient to guarantee uninterrupted blood flow and to prevent ostial occlusion during relative hypotension periods (Figure 1). The Solo Freedom stentless valve was sutured as usual, applying three continuous running 4/0 polypropilene sutures. At the level of the coronary ostia, the sutures were passed from inside of the coronary ostia to the prosthesis sewing skirt. The aorta was unclamped, the patient was gradually weaned from CPB with milrinone and norepinephrine infusion, and the operation was completed in a traditional manner.

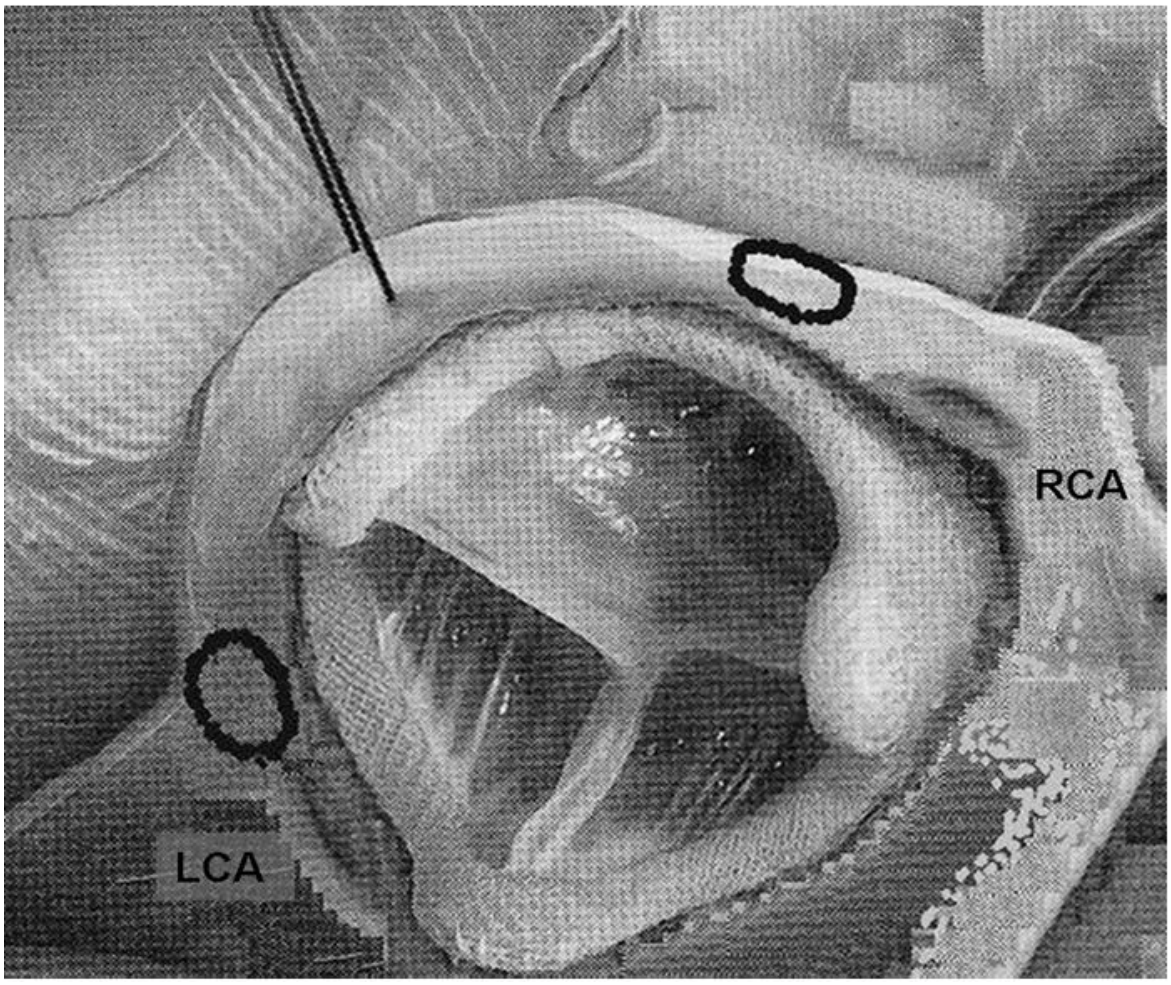

Figure 1: Schematic view of implanted stented tissue prosthesis in seat, abnormally low and paracomissural localization of both the coronary ostia (LCA, left coronary artery; RCA, right coronary artery), indicated by the white arrows, and (dotted black line) normal position of the coronary ostia, indicated by the black arrows.

Despite some increase of the serum troponine I (max 59.8 pg/l on postoperative day #2), the postoperative course was uneventful. For short VT runs and frequent ventricular extra systole the patient requested iv lidocain infusion in the early postoperative period. Atrial fibrillation episodes were treated by iv amiodarone and blood potassium repletion. Moderate inotropic support with norepinephrine and milrinone was applied to overcome low cardiac output syndrome.

Following slow, but progressive functional improvement, the patient was discharged to a rehab-center on the 15th postoperative day with normal left ventricular systolic function. At 3 months follow-up, the patient was alive and well-doing, the implanted stentless tissue prosthesis was normally functioning, and the ventricular contractility was normal.

Comment

Intraoperative acute coronary artery thrombosis during valve procedures is a well-known complication in mitral and aortic valve procedures with mechanical valve implant and in patients affected by bacterial endocarditis. But it is a very rare complication in patients receiving biological prostheses. In the unique relevant up-to-date publication [1], probable association of several factors - particular structure of aortic sinuses, annulus dimensions, endothelium damage caused during decalcification, tears in the bio prosthetic sewing ring, unknown coagulation diathesis and the structure of the Carpentier-Edwards Magna support have been accused to induce this very unusual complication. Another report has been published on two clinical cases of acute fibrin deposition on the Edwards Life sciences pericardial valve with no obvious causing factor [2]. These cases may be an example of excessive, abnormal thrombogenicity of tissue valves in selected patients.

The causes leading to acute thrombosis of the left main coronary artery ostium in our patient remain unknown. After seating the stented prosthesis in place, the coronary ostia were patent at surgical inspection and at transesophageal echography (Video 1). Moreover, epicardial Doppler flow metry had demonstrated a normal flow pattern in coronary arteries. Finally, we did not use selective cardioplegia, thus, the coronary ostia were left untouched and intact, and the endocardium of the aortic sinuses was not damaged. However, we believe that the hemodynamic collapse of the aortic root during a probable short period of relative arterial hypotension or arterial pressure fluctuations could have contributed to the course of the complication by creating a favorable rheological substrate due to a narrowed space between the valve stent strut and the left coronary ostium. This hypothesis might be corroborated by the fact that the use of a stentless prosthesis - with no hard structures to occlude the coronary orifice - has led to a complete resolution of the complication. However, similarly to Patane' F. et al, we could not establish with certainty the causes of this complication.

The origins of the coronaries show great variability, and the prevalence of anomalous coronary origins was described previously by Joshi SD et al. [3] in a cadaveric study of 105 hearts. Interestingly, only 41% and 77% of the right and left coronary ostia, respectively, had a central position with reference to the commissures. The ostia (right and left) were seen as vertical, horizontal, or crescentic slits in 8.6% and 7.6%, respectively. The attending surgeon who operated the patient pointed out that particular anatomy of the coronary ostia located extremely close to the aortic annulus impeded him the implantation of stented prosthesis on a greater/larger distance from the latters, and decided therefore to implant a stentless prosthesis. It was not until direct surgical inspection of the aortic root however that this particular anatomy was diagnosed.

Certainly, Trans catheter Aortic Valve Implantation (TAVI) could also be an option in such a situation, but we are unable to precisely estimate all the risks and hazards of the deployment of a trans catheter device into an anomalous aortic root without direct visual control. On the contrary, suture less prostheses feature less bulky sewing ring (or do not present it at all) and all the advantages of direct surgical control as well as the possibility of a repeated implantation of the same device in the case of faulty first deployment. So, suture less prostheses and TAVI represent possible technical options in a similar situation, too.

This clinical case happened to us before the era of the extensive use of suture less prostheses in our department, so that the unique available option was a stent less prosthesis. Perfectness is unreachable, and every surgical device and prosthesis has its own drawbacks and limitations. Stentless prostheses are not an exception. Optimizing hemodynamics to prevent patient-prosthetic mismatch and improve durability, stentless bio prostheses use was revived in the early 1990s. Nonetheless, the introduction of stentless valves into clinical practice has not replaced stented valve prosthesis as expected a decade ago.

Stentless prostheses were found to be advantageous in patients with severe impaired left ventricular function or a small aortic annulus (i.e., evidence of grade II), but no specific advantages could be determined for the majority of patients. The durability results were mixed: the Toronto SPV (St. Jude Medical, Minneapolis, MN) showed an increase in degeneration after 10 years of follow-up, whereas the Freestyle porcine stentless prostheses (Medtronic, Minneapolis, MN) still showed excellent results after this period [4].

However, until now, there is no definite evidence on the superiority of stentless over stented bio prostheses. Structural valve deterioration resulting from cusp tear with consequent aortic regurgitation remains the main contributing factor to the lower freedom from reoperation compared with stented bio prostheses [5]. There are many contradictory studies published, and there was no level I or IIa evidence of more effective orifice area, mean pressure gradient, left ventricular mass regression, surgical risk, durability, and late outcomes in stentless bio prostheses. There is no general recommendation to prefer stentless bio prostheses in all patients.

The overall dilemma is the absence of large randomized studies. In general, both clinical and experimental studies show that stentless valves have several biomechanical and haemodynamic benefits when compared with stented valves, though new generation pericardial valves have excellent blood flow profiles.

However, stentless and stented valves seem to perform equally well when it comes to various clinical parameters [6,7].

Proposing the idea that prevention is superior to any kind of treatment, we speculate that it was probably better to opt directly for stentless or suture less valves in the described clinic-anatomical situation.

Disclosures

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References

1. Patanè F, Sansone F, Campanella A, Asteggiano F, Rinaldi M (2009) Acute bioprosthetic thrombosis immediately after aortic valve replacement. J Cardiovasc Med 10: 167-169.
2. Bose AK, Hon JK, Chanda B, Uppal R, Kendall S (2009) Acute fibrin deposition causing acute failure of two tissue pericardial valves. Ann Thorac Surg 88: 989-992.
3. Joshi SD, Joshi SS, Athavale SA (2010) Origins of the coronary arteries and their significance. Clinics 65: 79-84.
4. Gulbins H, Reichenspurner H (2009) Which patients benefit from stentless aortic valve replacement?. Ann Thorac Surg 88: 2061-2068.
5. Kobayashi J (2011) Stentless aortic valve replacement: an update. Vasc Health Risk Manag 7: 345-351.
6. Funder JA (2012) Current status on stentless aortic bioprosthesis: a clinical and experimental perspective. Eur J Cardiothorac Surg 41: 790-799.
7. Murtuza B, Pepper JR, Jones C, Nihoyannopoulos P, Darzi A, et al. (2011) Does stentless aortic valve implantation increase perioperative risk? A critical appraisal of the literature and risk of bias analysis. Eur J Cardiothorac Surg 39: 643-652.

Video 1: Transesophageal B-mode (left screen) and color Doppler (right screen) echocardiography. Patent left main stem is seen immediately after the implant of stented tissue valve.