Clinics in Surgery

Case Report
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Dealing with the Unexpected but Chasing the Inevitable: Atrio-Ventricular Disruption Following Aortic Valve Replacement in an Elderly Patient

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Abstract

Atrioventricular groove ruptures is almost always lethal. We report the successful repair of a rupture of the atrioventricular groove in an elderly patient who underwent an aortic valve replacement and the sequel of complications preceding this.

Introduction

Atrio-ventricular groove rupture remains a challenging and feared event for any cardiac surgeon. The outcome is almost always fatal. Here we present the occurrence of this event following aortic valve replacement in an elderly patient.

Case Presentation

A 73 year old lady was referred to our hospital with a 12-month history of worsening shortness of breath on exertion. Three years earlier, she presented with shortness of breath and chest pain. A thallium scan suggested a large area of reversibility and a subsequent angiogram showed 2-vessel disease. Drug Eluting Stents were inserted into her left anterior descending and circumflex arteries. She stopped smoking forty years earlier and her past medical history included hyperlipidaemia and hypertension. Her past surgical history included a Right sided mastectomy for breast cancer in 2001, alongside adjuvant radiotherapy. She also underwent a trabeculectomy for glaucoma in 2004.

On examination, she had a short stature of 4 ft 11". She had a slow rising pulse with an ejection systolic murmur radiating to her carotids. Echocardiography revealed good LV systolic function and a peak gradient across the aortic valve of 75 mmHg with a mean of 41 mmHg. The aortic valve surface area was calculated at 0.7 cm^2. She also has mild MR and a systolic pulmonary artery pressure of 30 mmHg. The decision was made for her to undergo a bio-prosthetic aortic valve replacement.

During surgery, her native aortic valve was tricuspid with 3 heavily calcified cusps which were excised and the annulus was cleaned from debris. The peri-operative TOE showed extensive calcifications of the mitral annulus confirming the pre-operative findings on the angiogram. While weaning from bypass significant bleeding was noted from the posterior aspect of the heart raising suspicion of a spontaneous atrio-ventricular groove rupture, which was confirmed on subsequent inspection. Cardiopulmonary bypass was reinstituted and the breach repaired using a pericardial patch. Complete haemostasis was achieved and cardiopulmonary bypass discontinued uneventfully. The early postoperative course was relatively uneventful. The following morning weaning from the ventilator was commenced but sudden collapse with no cardiac output required resuscitation manoeuvres and emergency chest reopening. Findings were consistent with significant bleeding from further myocardial rupture on the left ventricular side. The defect was repaired without cardiopulmonary bypass using two 4/0 Prolene pledgeted sutures; in addition, the whole anterior and lateral ventricular walls were re-enforced with 2 patches of pericardium fixed to the surface with Bio Glue achieving complete haemostasis. The insertion of an intra-aortic balloon pump was deemed necessary to supplement the already significant inotropic support.

She remained critical requiring prolonged ventilation with several failed weaning attempts. Her poor neurological status and the development of abdominal distension led to further imaging investigations, which confirmed a likely infarct in the high right occipital/occipito-parietal region

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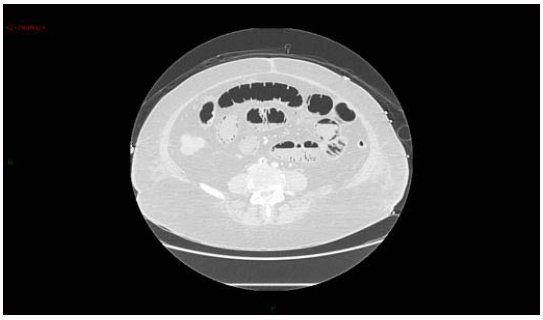

Figure 1:

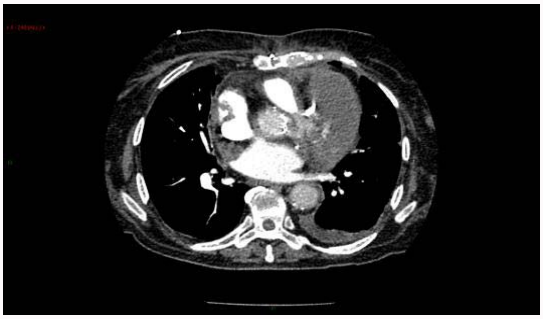

Figure 2:

and significant bowel ischaemia. General surgical opinion was sought and a laparotomy performed: small bowel resection was required with demarcation levels just beyond the duodeno-jejunal flexure around and 18 inches proximal to the terminal ileum. Post resection, there remained approximately 6cm of proximal duodenum just distally to the DJ flexure and around 35 cm of terminal ileum, which were both tied off with a view to re-explore the abdomen in 48 h prior to anastomosis. During re-exploration a further 5cm of terminal Ileum was resected and an end to end anastomosis was carried out as planned (Figure 1).

Following extubation, she had a slow recovery requiring TPN and pharmacological treatment for onset of atrial flutter with subsequent DC cardio version in the absence of atrial clots on TOE assessment. Finally, she was discharged to her local hospital for continuity of care.

She was readmitted to our hospital 2 months later because of increasing shortness of breath. A CT Pulmonary Angiogram had already revealed a large (\R\5 cm) left pericardial haematoma compressing the origin of the RVOT/pulmonary trunk. A subsequent Gated CT of the Aorta showed a complex pseudo-aneurysm measuring up to 3 cm in diameter, which appeared to communicate with the distal left main stem with most of its blood supply from a wide neck (2.5 mm) fistulous connection with the aortic isthmus. A large pericardial haematoma measuring at least 9.5 cm in maximal diameter with significant external compression of the right ventricular outflow tract was confirmed (Figure 2).

Following MDT discussion, it was agreed that further surgical intervention would not be a suitable option. Instead, a trans-catheter closure would be attempted (Figure 3).

The procedure was challenging but eventually a device was successfully deployed to close the defect.

A repeat Aorta gated CT performed 2 days post procedure

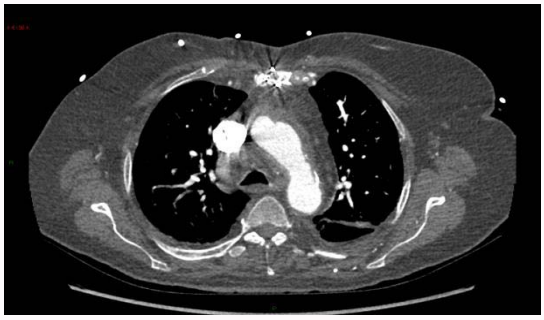

Figure 3:

showed the closure device within the mitro-aortic curtain but the pseudo-aneurysm of the left main stem remained unchanged with an increasing haematoma (84 × 55 × 37 mm) compressing the pulmonary trunk.

A week later, she developed features suggestive of tamponade confirmed on echocardiographic assessment with haemodynamic compromise. A pericardiocentesis was attempted but abandoned shortly after. Further deterioration and ongoing sepsis led to her death after five months following her aortic valve replacement.

Discussion

Atrio-ventricular rupture is usually witnessed following mitral replacement in the presence of a heavily calcified annulus [1,2] although it may occur in other less common scenarios such as aortic valve replacement, excessive cardiac manipulation or trauma [3-5].

The outcome is almost always fatal. It is not surprising that it has been widely recognised as one of the worst nightmares for a cardiac surgeon regardless the level of experience.

It is always tempting to show off by discussing successful outcomes or reporting clinical cases where we have made something to be proud of. On this occasion, we sought to share a not so successful clinical case in order to stress how easy it can be to become overconfident after an initial successful repair and then having to reconsider your boundaries and accept defeat.

Despite unnecessary manipulation of the heart during the procedure, the inevitable did happen. Distortion of the mitral annulus already compromised by the presence of significant calcifications may have certainly played a role. Other likely contributing factors include cardiomegaly, previous myocardial infarction and advanced age. The atrioventricular groove remains a naturally weakened transitional area in view of its embriological features where the conduction tissue is the only muscular continuity between atrial and ventricular chambers [6-8]. The early postoperative event requiring further repair following emergency reopening in intensive care proved to be untimely complication. The initial successful combination of suturing and surgical sealants only delayed the point of no return confirming the challenge and demand related to such cases.

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