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Title:
High risk re-do Sternotomy and repair of Aortic root false aneurysm and obstructed innominate branch of dacron graft

Short title:
Re-do branch first total aortic arch replacement

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Corresponding author is not a recipient of a research scholarship

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Management of complex thoracic aortic pathologies can be challenging. The patient's outcome is influenced by a plethora of factors that include surgical technique, patient's co-morbidities and optimal post-operative care. Re-sternotomy itself is an independent risk factor for mortality after aortic surgery[1]. We describe a case of re-sternotomy, branch first arch replacement, freestyle root replacement and frozen elephant trunk.

A 63-year-old male presented with shortness of breath on exertion and amaurosis fugax. Nine years prior, he had an acute Type A aortic dissection from the aortic root to the aortic bifurcation. This was treated with aortic valve (AV) resuspension, ascending aortic and hemi-arch replacement with debranching of the innominate and left common carotid arteries (LCCA). His comorbidities included hypertension, obstructive sleep apnea and recurrent episodes of pneumonia. Transoesophageal echocardiography (TOE) showed moderate-severe global left ventricular (LV) dysfunction, moderate right ventricular (RV) dysfunction, severe supra-valvular aortic stenosis, mild aortic regurgitation and elevated pulmonary artery pressure. Computed Tomography (CT) aortogram showed a large partially thrombosed false aneurysm at the proximal end of the ascending aortic graft, severe stenosis at the innominate branch (Figure 1) and a residual dissection flap from the left subclavian artery (LSCA) to the proximal common iliac arteries. The proximal descending aorta measured 4.3 cm and had a widely patent false lumen. Catheter

angiography showed only mild coronary artery disease and confirmed the innominate obstruction (Figure 2).

Given the above findings and the patient's age, surgical intervention was decided on despite the high risk. Re-sternotomy was performed using an oscillating saw without complications after securing an 18 French cannula into the right common femoral artery. Mature clot was found obstructing the innominate branch of the graft. There was an aortic root false aneurysm where the intima had necrosed and pulled out of the proximal suture line causing dehiscence of the dacron graft at the level of the sinotubular junction around the non-coronary sinus. There was severe extrinsic compression of the graft (Figure 3).

After division of extensive pericardial adhesions cardiopulmonary bypass (CPB) was established using the right axillary and right femoral artery inflow. The innominate, LCCA and LSCA were sequentially debranched onto a trifurcation graft whilst maintaining ante grade cerebral perfusion via the right axillary artery. The de-branched arch and ascending aorta were mobilized and cross-clamped, allowing opening of the aorta. The old dacron graft was excised in its entirety. The aortic root was excised and a Bentall's procedure was performed using a 27mm Medtronic Freestyle Stentless Porcine Bio-root. Once target temperature of 25°C was reached, cross clamp was removed and under distal circulatory arrest a 28mm EVITA hybrid stent graft was deployed into the true lumen of the descending thoracic aorta over a femoral artery guide wire, enabling future endovascular aortic repair to manage aneurysmal degeneration of the descending aorta or visceral

malperfusion. The distal anastomosis was performed beyond the level of the ligated LSCA. The common stem of the trifurcation graft was then anastomosed on to the neo ascending aortic graft. CPB was easily weaned with low dose adrenaline. TOE revealed excellent AV function and excellent flow through the stent graft in the true lumen.

His post-operative course was prolonged with generalized deconditioning, acute on chronic kidney injury and aspiration pneumonia. There was no new post-operative neurologic dysfunction, he made a full recovery and was discharged home after a stint at the rehabilitation ward. Two months after surgery, Transthoracic echocardiography (TTE) showed significant improvement in biventricular function with low normal LV and RV systolic function and normal functioning of the bioprosthetic AV. CT aortogram showed intact proximal and distal anastomotic sites of the aortic graft with no evidence of contrast leak. The arch vessels were patent coming off a trifurcation graft with the frozen elephant trunk in the distal arch extending just above the level of the diaphragm within the true lumen of the aorta. The superior portion of the false lumen was not opacified and there was no aneurysmal degeneration of the aorta. All the visceral vessels arose from the true lumen.

Complications of aortic surgery that require re-operation are uncommon and associated with a high risk of morbidity and mortality. Renal dysfunction, chronic obstructive pulmonary disease and increased CPB time are risk factors for mortality[2].

Extensive pre-operative investigation, planning and a multidisciplinary team approach is crucial in achieving an excellent outcome for these patients. Pre - entry establishment

of CPB, hypothermic distal circulatory arrest, safe sternal re-entry and the branch first arch replacement technique[3], allow these complex cases to be performed in a more routine manner[4,5.]

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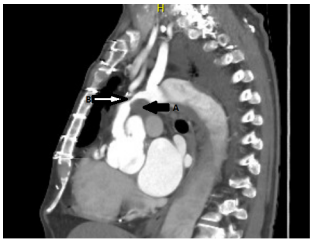

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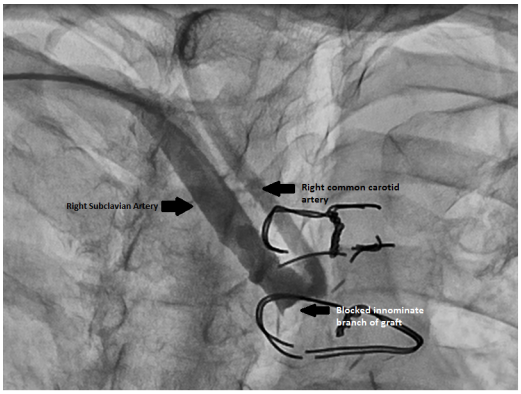

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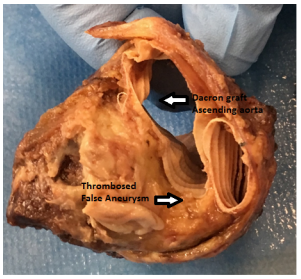

Figure 3.tiff

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