

## REPLACEMENT OF THE WHOLE DESCENDING THORACIC AORTIC ANEURYSM WITH A TUBULAR GRAFT BY INCORPORATING CENTRIFUGAL PUMP AND INTRA-OPERATIVE CELL SALVAGE MACHINE

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### INTRODUCTION

Thoracic aortic aneurysm is a serious health entity which when gets ruptured leads to death of fifty percent of the patients before reaching the hospital. Out of those 50% which reach hospital, approximately 75% percent die later in the hospital.

Incidence of these aneurysms is 6 cases per hundred thousand populations per year. Overall prevalence of aneurysm is increasing in the last thirty years, which is in part due to wide spread use of the imaging techniques [1].

Elective repair of these aneurysms is done either by open surgical method or by employing endovascular stents. In open surgical repair, there is moderate to severe bleeding which demands repeated blood transfusions which in turn have its own attendant risks and side-effects. This problem of heavy blood loss is solved, in great part, by employing a relatively new gadget called Intra-operative salvage machine (also called cell-saver). This cell-saver collects the shed blood, washes, concentrates and finally stores it for re-infusion to the patient. Here we case report a surgically treated case of thoracic aortic aneurysm using centrifugal pump and cell-saver at AFIC/NIHD Rawalpindi.

### CASE REPORT

A fifty six years old man presented to us with a one year history of pain in the interscapular region and two weeks complaint of dysphagia. He was an ex-smoker but was hypertensive on treatment for last twenty two years. He was thoroughly worked out for his symptoms. Routine laboratory investigations along with renal function tests,

liver function tests and twenty four hours creatinine clearance were within normal range. Imaging techniques including chest x-ray, 2-D Echo-cardiography, Transoesophageal echocardiography, CT-scan chest and magnetic resonance angiography chest confirmed an aneurysm of about 7.8 cm of the whole descending thoracic aorta upto the diaphragmatic hiatal aortic opening (Figure). His coronary angiography was within normal limits and carotid doppler showed 50% stenosis in left internal carotid artery. He was offered surgery as a high risk case, which he consented for. He was anaesthetized with a double lumen tube maintaining a single lung ventilation (right lung was ventilated and the left lung was collapsed).

A left postero-lateral thoracotomy was done with a double intercostal incision between 4th and 6th ribs. After retracting the left lung the aneurysm was found to be involving the whole of the descending aorta and was densely adherent to the lung. The aorta was made free from the lung. Proximal aortic control just distal to the left subclavian artery (LCA) and distal aortic control about 2cm from its hiatal opening were achieved by sharp dissection. Then the left atrio-femoral centrifugal by-pass was established by cannulating the left common femoral artery and the left atrium. Here the intra-operative cell salvage machine (commonly called as cell-saver) was brought into the operative field which started collecting the shed blood from the operative field. Proximal cross clamp was applied just above the left subclavian artery and the distal cross-clamp was applied just above the hiatal aortic opening. Descending thoracic aorta was opened along its whole length between the clamps. Its inner wall contained lot of fibrous and fibrinous material. Intercostal arterial luminae were identified from their back bleeding and were occluded. Then the aorta was incised at

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proximal and distal clamp sites leaving a 2 cm sleeve for anastomosis. A size 24 cm Vasotec aortic tubular graft was anastomosed to the proximal and the distal aortic sleeve with a continuous running suture. Before completing the distal anastomosis, proximal clamp was opened and the tubular graft was de-aired. Haemostasis was secured and the native aortic wall was wrapped around the tubular graft with a continuous running suture. Partial centrifugal atrio-femoral by-pass was successfully weaned off by removing left atrial and femoral artery cannula.

Intraoperative cell salvage machine performed a wonderful function and after collecting and processing the collected blood, washed it in its reservoir. About 1938ml of the concentrated red blood cell volume was re-transfused to the patient. Single lung ventilation was converted into two lungs ventilation and the left lung was fully inflated. 2 x pleural drains were placed in the left pleural cavity. Patient was kept ventilated for about 12 hours and was weaned off ventilator and ex-tubated with intact spinal



Figure: MRA chest of the patient

cord and normal renal function.

## DISCUSSION

True etiology of aortic aneurysms is probably multifactorial and it occurs with individual risk factors. Risk factors include smoking, hypertension, atherosclerosis, bicuspid or unicuspid.

Aortic valve, genetic factors like Marfan's syndrome, type IV Ehlers-Danlos syndrome, infection (like syphilis), arteritis (like Takayasu) and trauma. Aortic aneurysms are more common in men than in women and are

also more common with chronic obstructive air way disease [2].

Most patients with aortic aneurysms are often asymptomatic at the time of discovery and are found incidentally after chest radiograph. Descending aortic aneurysm causes back pain, localised between scapulae and when it compress the trachea, stridor, wheezing or cough may also occur. These aneurysms may rupture, causing left haemothorax and haemoptysis. During the case work-up, routine lab investigations and imaging techniques of X-Ray chest, 2-D Echo, USG, aortography, coronary angiography, CT-Scan, magnetic resonance imaging (MRI) and magnetic resonance angiography can help accurately demonstrate the size of aneurysm and its association to branch vessels, as we did in this case.

All aneurysms must be treated with risk factor reduction with control of hypertension and cessation of smoking before embarking upon any intervention.

Indications for surgery are based on growth, size and symptomatology. Aneurysmal size determines the criterion for surgical repair. Descending aortic aneurysms with size of 6.5mm are taken for surgical repair even without any symptoms [3]

Use of double lumen endotracheal tube helped improve visualization of operative field. This DLET overall decreased operative time and therefore reduced risk of spinal-cord and renal injury. It also reduced left lung retraction and trauma [4].

We employed left atrio-femoral centrifugal bypass for maintaining the perfusion distal to the aortic cross clamp, while repairing the aortic aneurysm. Other techniques used are aortic cross-clamping with resection of aneurysm and sewing of the graft, use of passive shunts like Goth shunt (which are heparin coated shunt used to maintain circulation distal to clamp), atrio-femoral bypass (also known left heart bypass), partial cardiopulmonary bypass (right atrial femoral bypass) and deep hypothermic circulatory arrest [5].

The main complications of aneurysmal surgery are paraplegia (2-20%) and renal failure (3-14%), both of which are normally avoidable by use of bypass or use of deep hypothermic circulatory arrest [6].

In short, properly planned aneurysmal surgery along with expert and expeditious anesthetic management and post-op management are the three spheres for a successful outcome.

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