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Case Report

Large Descending Thoracic Aortic Aneurysm Repaired with Endovascular Stent Grafting- A Rare Entity

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Abstract: A thoracic aortic aneurysm is a weakened area in the upper area of the aorta. A thoracic aortic aneurysm can also be called as thoracic aneurysm and aortic dissection (TAAD) because it can cause life-threatening bleeding due to tear in the artery wall (dissection). Thoracic aortic aneurysms usually grow very slowly and predominantly remain asymptomatic, making them difficult to detect by regular investigation modalities. Many start small and remain small throughout, but few aneurysms expand over time and rupture causing medical emergencies. Growth of the aneurysms is highly unpredictable. Depending on the size and growth rate of your thoracic aortic aneurysm, treatment may vary from watchful waiting to emergency surgery.
Keywords: Aneurysm, Descending Thoracic Aorta, Dissection, Mural Thrombus, Stent-grafting.

INTRODUCTION

Aneurysms of the aorta are at times evaluated and treated by physicians from a number of specialties, cardiac surgeons operate on the ascending aorta and arch of aorta whereas vascular surgeons manage abdominal aortic aneurysms, and at present the responsibility often falls to cardiologists to oversee the medical care of patients with aortic disease or aneurysms of all types. However, although trained in various aspects of cardiovascular medicine, most cardiologists devote their attention mainly to the heart and its coronary arteries. It is therefore important that cardiologists acquire a sufficient knowledge base so that they can confidently evaluate and manage patients with aortic disease and know when it is appropriate to refer them for surgery so as to minimize morbidity and mortality of the case. Thoracic aneurysms may involve one or more aortic segments (aortic root, ascending aorta, arch, or descending aorta) and are classified accordingly. Sixty percent of thoracic aortic aneurysms involve the aortic root and/or ascending aorta, 40% involve the descending aorta, 10% involve the arch, and 10% involve the thoraco-abdominal aorta. The etiology, natural history, and treatment of thoracic aneurysms differ for each of these segments. Aneurysms of the ascending thoracic aorta most often result from cystic medial degeneration, which appears histologically as smooth muscle cell dropout and elastic fiber degeneration. Medial degeneration leads to weakening of the aortic wall, which in turn results in aortic dilatation and aneurysm formation. When such aneurysms involve the aortic root, the anatomy is often referred to as annuloaortic ectasia. Cystic medial degeneration occurs normally to some extent with aging, but the process is accelerated by hypertension [1]. We present a rare case of large descending thoracic aortic aneurysm with a mural thrombus in a 62 years old male patient who was successfully treated with endovascular stent-grafting.

CASE REPORT

A 62-year-old man presented with history of left sided chest pain of 3 months duration. The pain was not related to exertion, cough, or chest/body movements and was non-radiating type of pain. He had no history of fever, arthralgia or palpable lymph nodes. He was a known case of hypertension on regular medications. Physical exam was normal with bilaterally equal radial pulses. A Chest X ray PA view showed a well-defined posterior mediastinal mass on the left side (Figure 1). A Computed tomography (CT scan) of thorax revealed a large Descending Thoracic Aorta Aneurysm of size 58 mm X 56 mm with a mural thrombus and no dissection at the time (Figure 2, 3 & 4). The aneurysm was limited to the descending thoracic aorta and a 2D Echo showed left ventricular hypertrophy with a tricuspid aortic valve. Compared with open surgical repair, endovascular stent-grafting appears to have acceptable peri-operative morbidity and mortality. He underwent an endovascular stent-grafting with no post-operative

complications (Figure 5, 6). On follow-up for 3 years, patient was totally asymptomatic since then.

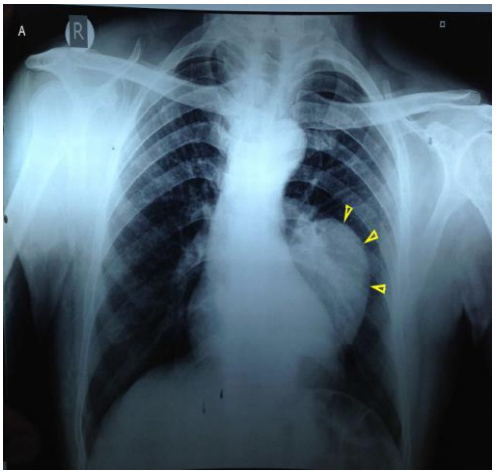

Fig-1: Chest Radiograph PA View showing Posterior Mediastinal Mass

Fig-2: 3D volume rendered 64 slice arterial phases CT showing isolated Descending Thoracic Aneurysm

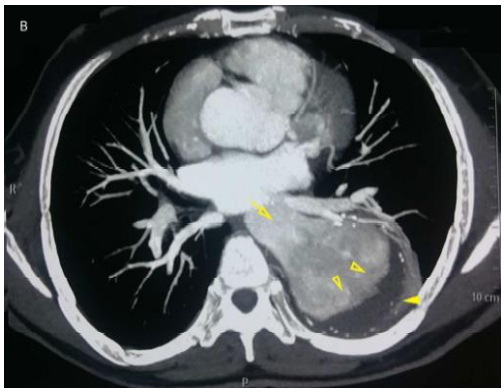

Fig-3: CT Scan-Axial view showing thoracic aorta aneurysm with mural thrombus

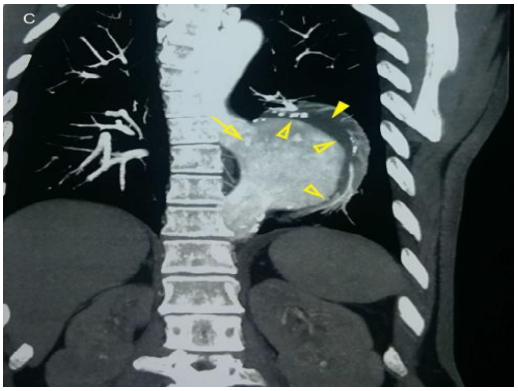

Fig-4: CT Scan-Coronal view showing thoracic aorta aneurysm with mural thrombus

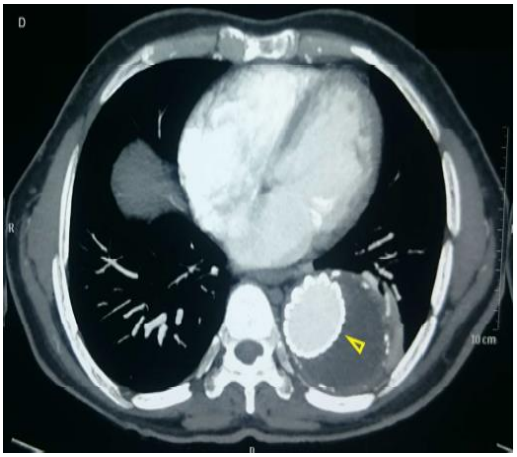

Fig-5: CT scan Thorax –Axial view showing the Endovascular stent in place with no leak

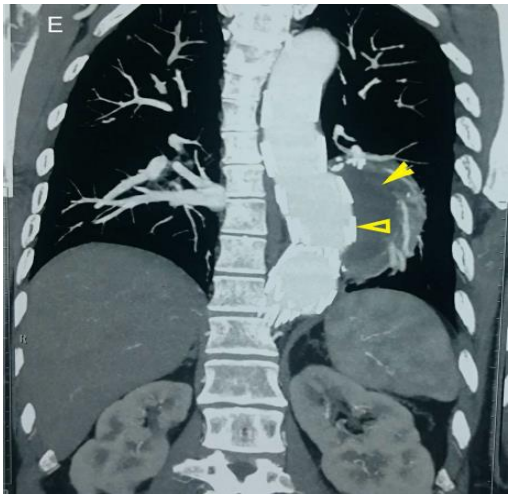

Fig-6: CT Thorax Coronal view showing the long segment of endovascular stent

DISCUSSION

Aneurysms can develop in any part of the aorta, when they occur in the upper part of the aorta; they are called thoracic aortic aneurysms and aneurysms that develop in the lower part of aorta are called abdominal aortic aneurysms. Aneurysms can also occur

in between the upper and lower parts of your aorta, and can be more than one at times. This type of aneurysm is called a Thoraco-Abdominal aneurysm. Abdominal aortic aneurysms are more common than thoracic aortic aneurysms. Thoracic aneurysms can occur anywhere along the thoracic aorta, including the ascending aorta near the heart, the aortic arch and the descending aorta which is the lower part of the thoracic aorta.

Factors that can contribute to an aneurysm's development include atherosclerosis which occurs due to high blood pressure and high cholesterol and is more common in older people, in younger patients' genetic conditions such as Marfan syndrome a genetic condition that affects the connective tissue in the body, are particularly at risk of a thoracic aortic aneurysm [2]. Besides Marfan syndrome, other similar disorders namely Ehlers-Danlos and Loeys-Dietz syndromes can also contribute to the development of thoracic aortic aneurysm. Some of the inflammatory medical conditions, such as giant cell arteritis and Takayasu arteritis may at times become the etiology of thoracic aortic aneurysms [3, 4]. Increased risk of thoracic aortic aneurysm is seen in people who were born with a bicuspid aortic valve, meaning the aortic valve has only two leaflets instead of three. In one study conducted by de Sa M *et al*, 75% of those with a bicuspid aortic valve undergoing aortic valve replacement surgery had biopsy-proven cystic medial necrosis of the thoracic aorta, compared with only 14% of those with tricuspid aortic valves undergoing similar surgery [5]. Inadequate production of fibrillin-1 during embryogenesis may result in both the bicuspid aortic valve and a weakened aortic wall [6]. Some of the rare causes for development of the aneurysms are traumatic injury to the aorta, tobacco use and untreated infections such a syphilis and salmonella.

Dissection or rupture of the aorta is the main complication of thoracic aortic aneurysm. A ruptured aortic aneurysm can lead to life-threatening internal bleeding and hypovolemic shock, risk increase with the size of the aneurysm, size of aneurysm is directly proportional to the risk of rupture.

Usually most of the thoracic aortic aneurysms are clearly evident on chest radiographs and are characterized by wide mediastinal silhouette, enlargement of the aortic knob, or deviation of the trachea. However, smaller aneurysms and at times some large ones do not produce any abnormalities on chest radiograph.

Contrast-enhanced CT scanning and Magnetic resonance angiography are the preferred modalities to define aortic anatomy and its branches, and these two investigation modalities accurately detect and size thoracic aortic aneurysms. Transthoracic echocardiography is effective only for imaging the aortic root and as a limited use in Marfan syndrome.

The medical therapies available to slow the growth of thoracic aortic aneurysms and reduce their risk of dissection or rupture are quite limited. According to the randomized study of adults with Marfan syndrome, Shores et al found that treatment with propranolol over 10 years resulted in a significantly slower rate of aortic dilatation, fewer aortic events, and lower mortality [7].

Surgical resection was the procedure of choice in the past before the invention of endovascular grafting but the most feared nonfatal complication of resection of descending thoracic and thoracoabdominal aneurysms is postoperative paraplegia secondary to interruption of the blood supply to the spinal cord . But a series of methods have been introduced later on to reduce the incidence of paraplegia; these include regional hypothermic protection of the spinal cord by epidural cooling throughout surgery, cerebrospinal fluid drainage, re-implantation of patent critical intercostal arteries, the use of intraoperative somatosensory evoked-potential monitoring, and maintenance of distal aortic perfusion during surgery with the use of atriofemoral bypass to the distal aorta.

Transluminally placed endovascular stent-graft is an alternative and better approach for repair of descending thoracic aneurysms with an advantage of being far less invasive than surgery and with potentially minimal postoperative complications and morbidity. Ellozy et al recently reported a series of 84 patients receiving endovascular stent-grafts to treat descending thoracic aortic aneurysms [8]. Primary technical success was achieved in 90% cases, and successful exclusion of the aneurysm was achieved in 82%. Compared with open surgical repair, endovascular stent-grafting does appear to have acceptable peri-operative morbidity and mortality [8]. Staged surgical repair is preferred in patients with multiple aneurysms.

CONCLUSION

Broad clinical awareness of aortic aneurysms and the appropriate methods of diagnosis will help reduce the morbidity and mortality. Modern imaging technique such as CT and MRI has made the sizing of aneurysms relatively easy. Treating clinicians who understand the fundamental principles of aortic aneurysms can comfortably determine when they should manage patients with medication and when to refer them for surgery Open surgical repair remains the standard intervention to treat most large thoracic aortic aneurysms and endovascular stent-grafting is used for small to large aneurysms with calculated risks and technical considerations which depends on patient to patient.

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