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Original Research Paper

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AORTIC ANEURYSM AND ITS COMPLICATIONS AS SEEN ON 128 SLICE COMPUTED TOMOGRAPHY, A RETROSPECTIVE OBSERVATIONAL STUDY FROM A TERTIARY CARE CENTRE.

Kiran Kumar Reddy Kona Resident, Department of Radiology and Imageology, NIMS, Hyderabad

Abhishek J. Arora* Associate Professor, Department of Radiology and Imageology, NIMS, Hyderabad *Corresponding Author

Jyotsna Yarlagadda Professor, Department of Radiology and Imageology, NIMS, Hyderabad

ABSTRACT Knowledge of the characteristic imaging features of aortic aneurysms and its complications is essential for the prompt, accurate diagnosis and for the prevention of life threatening complications. In this retrospective analysis, we aim to familiarize the readers with computed tomography angiography (CTA) findings in aortic aneurysm and its complications. Out of total 52 patients with aortic aneurysms in our study 24(46%) patients were found to have thoracic aorta aneurysm, 19(37%) patients were found to have abdominal aortic aneurysm and 9 (17%) patients were found to have thoracoabdominal aortic aneurysms, while based on the shape, fusiform aneurysms were found in 37(71%) patients and saccular aneurysms were found in 15 (29%).

KEYWORDS :

INTRODUCTION

Early diagnosis and treatment of Aortic Aneurysms is very important to prevent catastrophic complications. Due to its ability to assess the morphologic features, presence of thrombus, relationship to adjacent structures and branches, peri-aortic soft -tissue, as well as its excellent vascular opacification and multiplanar reconstruction capabilities, Multidetector CT Angiography (MDCTA) has become an integral part of the evaluation of aortic aneurysms. In the given retrospective analysis, we aim to familiarize the readers with CTA findings in aortic aneurysm, its complications including rupture, infection and other rare complications namely aorto-enteric fistula.

AIMS AND OBJECTIVES.

1) To describe the types and causes of aortic aneurysm.
2) To illustrate the CT appearance of aortic aneurysms and its complications.

Table 1 : Size criteria for Aortic Aneurysms

Segment	Size (more than or equal to)
Ascending	5cms
Descending Thoracic	4cms
Descending Abdominal	3cms

Material and Methods:

The study was conducted in Department of Radiology of our Institute. A retrospective review of database was performed to identify patients with aortic aneurysm referred for computed tomography angiography between August 2017 to July 2019 . Total of 52 patients with aortic aneurysm were evaluated.

Classification of Aortic Aneurysms:

Based on aortic segment involvement:

Thoracic Aortic Aneurysm: Overall atherosclerosis is the most frequent cause of thoracic aneurysms, however cystic median necrosis is the most common cause of an aneurysm isolated to the ascending aorta, especially when annuloaortic ectasia is present(1). Usually, most common cause of cystic median necrosis is Marfan syndrome, but in one third of the cases, it is idiopathic (1).

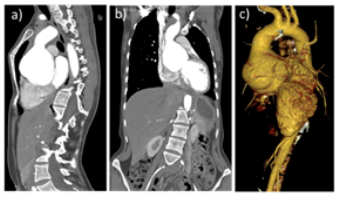

Fig.1: Ascending aorta aneurysm in a 24 yr female in a known case of Marfan syndrome. Axial(a),coronal (b),Volume Rendering(C) CTA images shows Annuloaortic ectasia producing a pear shaped aorta that tapers to a normal aortic arch, a finding characteristic of Marfan syndrome.

Abdominal Aortic Aneurysm: Atherosclerosis is the most common cause of abdominal aortic aneurysms.

Thoracoabdominal Aneurysms: Thoracoabdominal aneurysms have been classified into four types by Crawford and DeNatale on the basis of their anatomic location. Of these four types, types II and III represent the greatest therapeutic challenge (1).

Table 2 : Classification of thoracoabdominal aneurysms (Crawford and DeNatale)

Classification	Description
Type 1	Origin of Subclavian to suprarenal aorta
Type 2	From Subclavian to aortic bifurcation
Type 3	Distal thoracic aorta to aortic bifurcation
Type 4	Limited to abdominal aorta below diaphragm

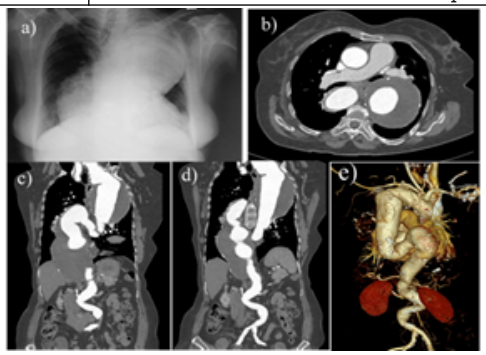

Fig.2: Fusiform dilatation of thoracoabdominal aorta with peripheral thrombus in a 70 yrs female. Chest radiograph(a), Axial (b), Coronal(c, d) and VR(e) CTA images show tortuous course of aorta with fusiform dilatation of thoracoabdominal aorta.

Based on Shape of Aneurysm:

Fusiform: Symmetrical bulge around circumference of aorta. Atherosclerotic aneurysms are fusiform in shape.

Saccular: Asymmetrical bulge and appears on one side of aorta. Usually caused by injury, infection or penetrating aortic ulcers (7).

Fig.3: Fusiform **Saccular**

True and False Aneurysms:

True aortic aneurysms: All three layers of the aortic wall (intima, media, and adventitia) are involved in aneurysm formation without disruption of any layers. They are usually fusiform in shape.

False (pseudoaneurysm): Intima is disrupted (and often the media as well) and blood is contained by the adventitia and periadventitial tissues. They are usually saccular, with a narrow neck at origin. Presence of wide neck suggests a mycotic origin (1).

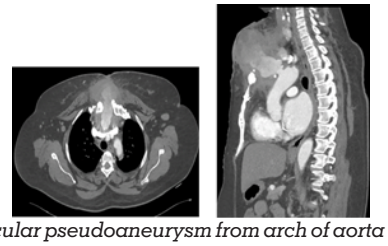

Fig.4: *Saccular pseudoaneurysm from arch of aorta extending through sternotomy defect into anterior chest wall in a 47yr female.*

Complications of Aortic Aneurysms.

Rupture: The risk of rupture increases with increasing aortic diameter with high risk at 6 cm for ascending and 7 cm for descending aorta (1, 2). Diagnostic findings include active contrast extravasation or high attenuation haemorrhagic collections in pleura, pericardium, and mediastinum or into retroperitoneum (3-6). Intraperitoneal rupture may also occur from anterolateral aspect of abdominal aorta (2).

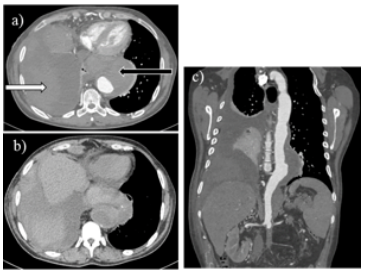

Fig.5: *Aortic aneurysm rupture in a 48 yr male with acute chest pain and hypotension. Axial contrast (a) CTA image shows hemothorax (white arrow) and high attenuating crescent sign (black arrow). Axial plain (b) and coronal contrast images(c) show similar findings.*

Imaging findings predictive of impending aneurysm rupture are rate of increase in size; an enlargement rate of 10mm or more per year is used as an indication for surgical repair, hyper attenuating crescent sign; best appreciated on unenhanced CT images. It represents an internal dissection of blood into either the peripheral thrombus or the aneurysm wall and focal discontinuity in circumferential wall calcifications (6).To label chronic contained rupture in aortic aneurysm, it should meet the following criteria: known abdominal aortic aneurysm, previous pain symptoms that may have resolved, stable hemodynamic status with a normal haematocrit, CT scan showing retroperitoneal haemorrhage and draped aorta sign. Draping of posterior aspect of aorta over adjacent vertebral body is an indicator of aortic wall insufficiency and contained rupture, even in absence of retroperitoneal haemorrhage (2).

Infected (Mycotic) Aneurysms. They can be caused by haematogenous seeding from septicaemia or contiguous involvement of vessel from an adjacent source of sepsis. The majority are located in thoracic or suprarenal abdominal aorta. CT angiography will show saccular shape as opposed to fusiform shape in atherosclerotic aneurysms, lobular contours, and periaortic inflammation, abscess, and mass. They have rapid expansion rate than that of atherosclerotic aneurysms and are very prone to rupture (3).

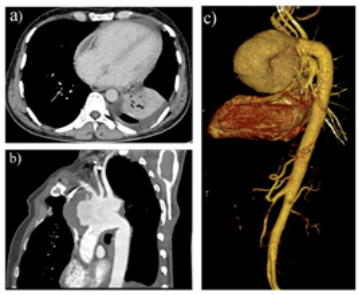

Fig.6: *Mycotic pseudoaneurysm secondary to tuberculous pericarditis in a 55 yr male. Axial (a) CTA image shows loculated pericardial effusion, Sagittal (b) and volume rendered(c) images show saccular aneurysm with lobular contours.*

Aortoenteric fistula. Aorto-enteric fistulas can be primary, caused by atherosclerotic aortic aneurysm or secondary to aortic reconstructive surgery. Secondary aorto-enteric fistulas are more common than primary fistulas (3, 5). The most commonly involved part of the gut is 3rd & 4th portions the duodenum (3). Symptoms usually include abdominal pain, hematemesis, and melena. CT imaging will show loss of normal fat plane between the aorta and duodenum and presence of air in aorta (3). The contrast extravasation into the bowel is diagnostic (3, 5).

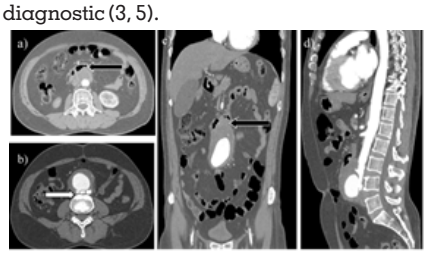

Fig.7: *Impending rupture of saccular infra renal aortic aneurysm with aortoenteric fistula in a 57 yr male who presented with melena and hematemesis. Axial(a,b) ,coronal(c), sagittal(d) CTA images shows saccular aneurysm from infra renal abdominal aorta with peripheral thrombus, draped aorta sign(white arrow) and communication with D2-D3 junction of duodenum(black arrows). Endoscopy revealed hematoma in D2-D3 junction with aortoenteric fistula.*

Aorto-caval fistula: It accounts for 1% of all aneurysms and in 3% of ruptured aortic aneurysms (3). Opacification of the IVC is noted in arterial phase (3).

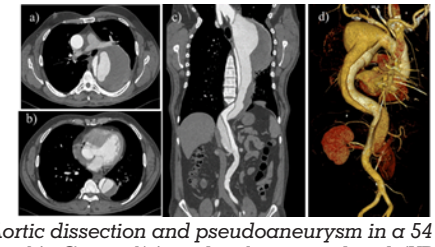

Fig.8: *Aortic dissection and pseudoaneurysm in a 54 yr male. Axial (a, b), Coronal(c) and volume rendered (VR)(d) CTA images show Stanford type-B aortic dissection with Saccular pseudoaneurysm of false lumen with eccentric mural thrombus.*

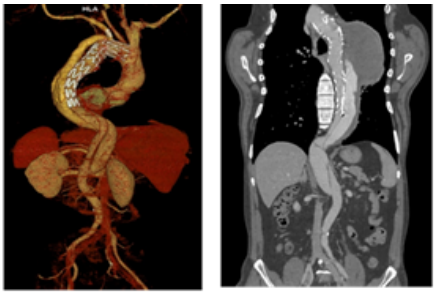

Fig.9: *Follow up MDCTA in the same patient after TEVAR procedure, shows patent stent graft in the true lumen and proximal left subclavian artery.*

RESULTS:

Out of total 52 patients with aortic aneurysms in our study, based on site of involvement, 24(46%) patients were found to have thoracic aorta aneurysm, 19(37%) patients were found to have abdominal aortic aneurysm and 9 (17%) patients were found to have thoracoabdominal aortic aneurysms. Based on the shape, fusiform aneurysms were found in 37(71%) patients while 15 (29%) patients had saccular aneurysms.

Regarding complications, partially thrombosed/peripheral thrombosis within dilatation were found in 18 patients, dissection was found in 9 patients while rupture was seen in 3 patients. Signs of impending rupture were found in 4 patients. One of the patient showed aorto-enteric fistula, while mycotic (infective) aneurysms were found in 4 patients.

In a study of 249 aneurysms of the aorta and its branches by Fomon et al (8), thoracic aorta aneurysms were seen in 41.3 % of cases, abdominal aortic aneurysms were seen in 30.9% of cases , thoracoabdominal aortic aneurysms were seen in 11.6 % of cases and dissecting aneurysms were seen in 17.3% of cases. The prevalence of aneurysms in different segments of aorta were similar to our study. The major limitation of our study is the small sample size.

CONCLUSION:

CT angiography is a robust tool for the evaluation of atherosclerotic aortic diseases, including aortic aneurysms. Aortic aneurysms most commonly occur as a consequence of atherosclerotic disease of the aorta. Knowledge of the causes, imaging appearances and potential complications of common and uncommon aortic aneurysms is essential for early and accurate diagnosis. CTA helps in preoperative planning for endovascular or surgical intervention and for follow-up imaging in the postoperative period.

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