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Case Report

Aortic Arch Aneurysm in Chronic Kidney Disease Patients: A Rare Duo

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Abstract:

Thoracic aortic aneurysm is a rare vascular disease. Most TAA are degenerative in origin and atherosclerosis and hypertension, aortitis secondary to infections or inflammatory disorders are other aetiology of TAA.

Keywords: Chronic kidney disease; abdominal aortic aneurysm; vascular disease

Introduction

Thoracic aortic aneurysm is a rare vascular disease. Most TAA are degenerative in origin and atherosclerosis and hypertension, aortitis secondary to infections or inflammatory disorders are other aetiology of TAA. Chronic kidney disease (CKD) is a known independent risk factor for the development of abdominal aortic aneurysm (AAA), however its independent role in development of thoracic aortic aneurysm is yet to be defined. Here we present a case of a middle-aged gentleman who was diagnosed to have isolated thoracic aortic arch aneurysm with chronic kidney disease as a risk factor.

Case Presentation

55 years old gentleman was admitted in our hospital with progressive dyspnoea for last six months. He also complained of weak voice and dyspnoea while lying down associated with dry cough for last one month. There was no history of dysphagia. He is a known case of diabetes Mellitus for last twelve years and chronic kidney disease for last seven months on maintenance haemodialysis. He was not a smoker.

There was no history of fever, night sweats, loss of weight and loss of appetite. No trauma history, no infection, no genetic diseases (Marfan syndrome, Ehlers-Danlos syndrome, Loeys-Dietz syndrome, familial thoracic aortic aneurysms and dissections, autosomal dominant polycystic kidney disease) or previous surgical interventions were present.

His physical examination was found to be normal. The blood pressure was measured on the right arm 147/80 mm Hg and on the left arm 155/88 mm Hg. Heart rate was 82 beats per minute and peripheral oxygen saturation at 98%.

Investigations

A complete blood count and serum chemistry panel revealed the following: leukocyte count, 6690/μL; haemoglobin, 8.5 g/dL; platelets, 22.1 × 104 /μL;

Creatinine, 7.74 mg/dl, urea 64 mg/dl, aspartate aminotransferase, 25 IU/L; alanine aminotransferase, 18 IU/L; and alkaline phosphatase, 212 IU/L. Additional blood work revealed the following: C-reactive protein, 6.16 mg/dL; Erythrocyte Sedimentation rate, 88 mm.

His blood culture was sterile and Sputum Xpert MTB/RIF assay was negative for Mycobacterium tuberculosis (MTB) and QuantiFERON-TB Gold (QFT) was negative.

A plain radiograph of the chest revealed decreased transparency of the left thoracic cavity and expanded mediastinal shadow. **(Figure 1)**

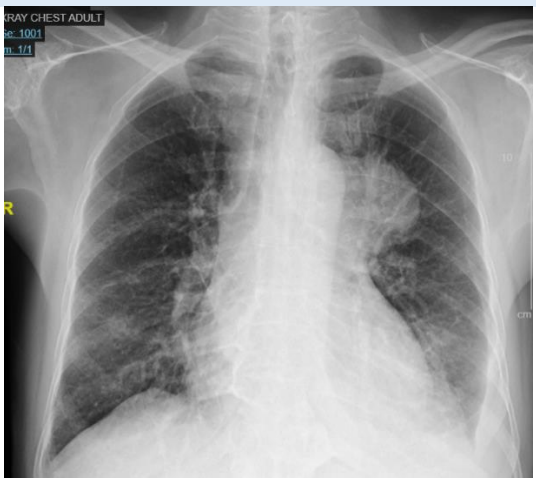

Figure 1: Plain radiograph of the chest showing decreased transparency of the left thoracic cavity and expanded mediastinal shadow.

Contrast-enhanced computed tomography angiogram from neck vessel to femoral arteries revealed a saccular aneurysm measuring 7.6 x 5.3 x 5.1 cm arising from the anterolateral wall of arch of aorta with peripheral hypodense area (likely thrombus) (Figure 2).

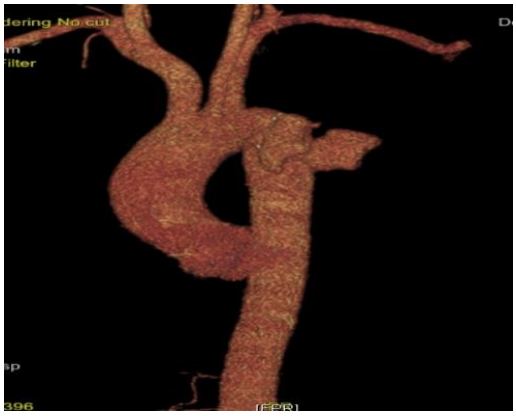

Figure 2: Contrast-enhanced computed tomography angiogram from neck vessel to femoral arteries showing a saccular aneurysm measuring 7.6 x 5.3 x 5.1 cm arising from the anterolateral wall of arch of aorta

Other neck vessels, abdominal aorta and its branches and bilateral iliac arteries were within normal calibre. (Figure 3)

Figure 3: Contrast-enhanced computed tomography angiogram from neck vessel to femoral arteries showing Other neck vessels, abdominal aorta and its branches and bilateral iliac arteries within normal calibre.

Treatment

He underwent fenestrated total arch endovascular aortic repair (Ishimaru Zone 0 to Zone 4 repair) of distal aortic arch aneurysm under general anaesthesia (Figure 4, Video 1)

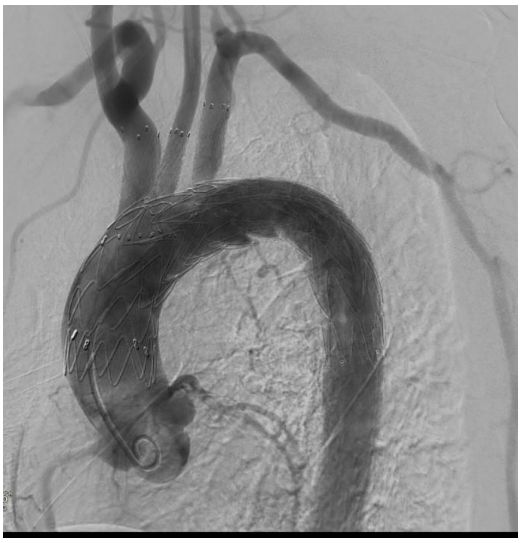

Figure 4: Angiogram showing fenestrated total arch endovascular aortic repair (Ishimaru Zone 0 to Zone 4 repair) of distal aortic arch aneurysm

Video.mp4

Video 1: Peripheral angiogram revealing aortic arch aneurysm

Figure 4, Video2: Peripheral angiogram revealing status post fenestrated total arch endovascular aortic repair (Ishimaru Zone 0 to Zone 4 repair) of distal aortic arch aneurysm.

Discussion

Thoracic aortic aneurysm (TTA) is a rare vascular disease. An isolated aortic arch aneurysm is even rarer. Aneurysms of the large arteries are diagnosed in up to 13 percent of patients with TAA; approximately 20 to 25 percent of patients with a large thoracic aortic aneurysm also have an abdominal aortic aneurysm (AAA). (1–3) Thoracic aneurysm mostly occurs in six or seventh decade and more common in males. Most TAA are degenerative in origin and atherosclerosis and hypertension, aortitis secondary to infections or inflammatory disorders like giant cell arteritis, Takayasu arteritis, IgG4 related disease, rheumatoid arthritis, Bechet syndrome are other aetiology of TAA. (4) Saccular thoracic aneurysms are frequently post-traumatic (high speed deceleration accidents). Although diabetes is associated with atherosclerosis, diabetes is negatively correlated with TAA, similar to abdominal aortic aneurysm. (5) Our patient did not have any of the common risk factors as described above.

He was a known case of chronic kidney disease. CKD are prone to developing several clinical cardiovascular endpoints, such as myocardial infarction, stroke, heart failure, CV mortality, and peripheral vascular disease. Decline in eGFR and proteinuria, have been independently associated with an increased risk for increase in diameter of the abdominal aorta (6), however role of CKD as an aetiology for thoracic aortic aneurysm is not properly studied in literature. A key pathogenetic factor, which is common to both CKD and aortic aneurysm, is the imbalance of the extracellular matrix (ECM) and it has been postulated that increased MMP activity in both the vasculature and kidney in CKD patients may be particularly involved in AAA development (7).

Most thoracic aortic aneurysms (TAAs) are degenerative in nature and breakdown of extracellular matrix proteins (like elastin and collagen) by proteases such as elastase, collagenase, various matrix metalloproteinases (MMPs) and plasmin plays a role in pathogenesis. (8,9) In view of similarity in pathogenesis CKD could be a risk factor even for

Thoracic aortic aneurysm (TTA). For thoracic aortic aneurysm (TTA) the mortality rate without surgical or interventional treatment is almost 100%. For patients with surgical indications, surgical treatments such as thoracic endovascular aortic repair (TEVAR) is always recommended.

Conclusion

Thoracic aortic aneurysm is a relatively rare disease and isolated aortic arch aneurysm is even rarer. Chronic kidney disease (CKD) is an independent risk factor for the development of abdominal aortic aneurysm (AAA), however its independent role in development of thoracic aortic aneurysm is yet to be defined. For patients who has surgical indications it is advisable to actively perform procedure such as thoracic endovascular aortic repair (TEVAR)

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