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Images in Medicine

Kommerell's diverticulum: A rare aortic arch anomaly

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ABSTRACT

Anomalies of the aortic arch associated with diverticulum are rare. We present a case of incidentally detected right-sided aortic arch with Kommerell's diverticulum and aberrant left subclavian artery.

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Introduction

Kommerell's diverticulum with a right-sided aortic arch is a rare congenital anomaly. It may be asymptomatic and can be detected as an incidental finding or it can present with symptoms related to compression of mediastinal structures. Rarely it can present with rupture of the diverticulum or aortic dissection. We report a case of incidentally detected Kommerell's diverticulum with a right-sided aortic arch.

Clinical background

A 40-year-old female patient presented with burning pain in the lower chest and epigastrium after meals since 3 months. There was no history of dysphagia, giddiness, syncopal

attacks, arm claudication, or tinnitus. On clinical examination, she was found to be hypertensive with blood pressure of 150/108 mmHg in the right arm in sitting position. Bilateral brachial and radial pulses were normally felt. The blood pressure in the left arm was 158/110 mmHg in sitting position. All biochemical and hematological investigations were normal. An upper GI endoscopy was also done, which showed features of mild gastritis and duodenitis.

Chest radiograph PA view done as a routine work-up of the patient showed right-sided aortic arch. Right lateral view of the chest showed mild indentation on the posterior tracheal wall by an ill-defined soft tissue opacity at the level of fourth and fifth dorsal vertebrae (Fig. 1). Barium swallow showed a smooth extrinsic indentation on the posterior and medial aspect of the esophagus at the same level (Fig. 2).

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Fig. 1 – (A) Chest radiograph PA view shows a right-sided aortic arch (white arrow). (B) The right lateral view of chest shows mild indentation on the posterior wall of trachea by ill-defined soft tissue opacity (small white arrows).

CT angiogram of the thoracic aorta was done with multiplanar reconstructions (MPR) along with volume rendered (VRT) and maximum intensity projection (MIP) reconstructions (Fig. 3). It showed a right-sided aortic arch along with a diverticulum measuring 2.1 cm × 2.5 cm × 2.8 cm

Fig. 2 – Barium swallow right posterior oblique view shows smooth extrinsic indentation on the posterior wall of esophagus by the Kommerell's diverticulum (black arrow).

(AP × Tr × CC) arising from left side of the proximal descending aorta. Anomalous origin of the left subclavian artery from this diverticulum was seen. The diverticulum was seen to displace the trachea and esophagus anteriorly. Anomalous origin of other branches of the aortic arch was also seen with left common carotid artery being the first branch, followed by right common carotid artery, right subclavian artery, and left subclavian artery in that order.

The patient was treated for dyspepsia, started on antihypertensive medication, and is presently under follow-up.

Discussion

Kommerell's diverticulum refers to the aneurysmal dilatation of the descending aorta at the origin of an aberrant subclavian artery, which is seen in both right- and left-sided aortic arches. Kommerell's diverticulum with a right-sided aortic arch is a rare congenital anomaly with an incidence of 0.05–0.1% in radiological series.^{1,2} It was first described by Kommerell, a German Radiologist, in 1936.³ His original description was in a patient with left-sided aortic arch where he described a pulsatile mass posterior to the esophagus causing its compression as seen on barium swallow. The Kommerell's diverticulum is also known as “lusoria diverticulum,” “remnant diverticulum,” or “lusoria root.”³

Three types of aortic arch diverticulum have been described.⁴⁻⁷

1. Diverticulum in a left-sided aortic arch with aberrant right subclavian artery.
2. Diverticulum in a right-sided aortic arch with aberrant left subclavian artery.
3. Diverticulum at the aortic-ductal junction.

Based on Edwards classification, right-sided aortic arch can be of three types.⁴

Fig. 3 – CT angiogram MIP coronal (A), axial (B), and VRT oblique (C) images show Kommerell's diverticulum (black arrow) arising from descending aorta. The aberrant left subclavian artery is seen to originate from this diverticulum (white arrow).

- Type I includes right-sided aortic arch with mirror image arch branches.
- Type II includes right-sided aortic arch with aberrant left subclavian artery and Kommerell's diverticulum.
- Type III includes right-sided aortic arch with isolated left subclavian artery communicating with the pulmonary artery.

This case had type II right-sided aortic arch. There was difference of 8 mm of Hg in systolic pressure measured in both upper limbs. Visualized parts of bilateral subclavian arteries were normal in caliber. This minor variation in blood pressure could possibly be related to atherosclerotic changes in distal upper limb arteries. However, the patient was asymptomatic for the same.

The aberrant left subclavian artery most commonly courses posterior to the esophagus in 80%⁷ of the cases. This condition may be asymptomatic or may cause symptoms due to mass effect on trachea and esophagus. The symptoms most commonly present after the age of forty years when the aortic wall becomes atherosclerotic and rigid and include dysphagia (dysphagia lusoria), cough, noisy breathing, chest pain, and

lower respiratory tract infection. The complications include rupture of the aneurysm with mediastinal hemorrhage, which could prove fatal,⁸ recurrent pneumonias, obstructive emphysema, or aortic dissection.⁹

Various congenital cardiac anomalies are seen to be associated with aortic arch anomalies, and these include Tetralogy of Fallot, pulmonary stenosis, tricuspid atresia, and truncus arteriosus. These are present in 5% to 10% of type II and in 75% to 85% of type I and type III right-sided arches.⁶ Tetralogy of Fallot is the most common heart anomaly in type I (93%), and it is present in 6.5% of type II and 0.5% of type III right-sided arches.¹⁰

The treatment is surgical and the exact approach depends on the anatomy, size, and presence of a concomitant thoracic aortic aneurysm. Endoaneurysmorrhaphy is done for small Kommerell's aneurysms with a normal descending thoracic aorta. Large Kommerell's aneurysms or Kommerell's aneurysms associated with an aneurysm of the descending thoracic aorta require an interposition graft. A left subclavian-carotid bypass is recommended prior to definitive repair to prevent arm claudication or subclavian steal syndrome.⁶

Conclusion

Right-sided aortic arch with Kommerell's diverticulum is a rare congenital anomaly, which may or may not be symptomatic. Knowledge of variants of aortic arch branching patterns is helpful in identifying this rare anomaly.

Conflicts of interest

The authors have none to declare.

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