A LUNG CANCER REVEALING A RIGHT AORTIC ARCH WITH A KOMMEREL DIVERTICULUM: A CASE REPORT


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ABSTRACT Right-sided aortic arch with Kommerel diverticulum is a rare anatomic variant that is more often fortunately discovered. These states can have some lethal complications (dissection, thrombosis). However, only a few studies have found an association with lung cancer. We will first report a case of 52 years old who have this association suspected first on chest X-Ray and confirmed later by chest angio-CT scan, which showed an aberrant dilated subclavian artery on its proximal segment. Then we will give some information about the right-sided aortic arch with the kommerel diverticulum and discuss the case.

KEYWORDS aortic arch, lung cancer, Kommerel diverticulum, angio CT-scan

Introduction

Right-sided aortic arches are rare aortic variants that can be associated with a bulbous dilatation of the origin of the subclavian artery called a Kommerel diverticulum. If the discovery is accidental, some patients can have some symptoms due to mediastinal structure compressions like dysphagia and dyspnea. Imaging plays a major role in detecting and characterising those congenital anomalies.

Case Report

We report a 52-year-old patient; from the Rif region and living in Casablanca, who is currently unemployed. This patient lives in a one-piece flat, poorly ventilated and sunny. He has no medical background and does not follow for any chronic disease; otherwise, he was a chronic smoker and cannabis consumer. He also had no familial medical background and no tuberculosis background. The history of the disease dates back to a month before his admission with a mucous bronchogenic syndrome aggravated a week before his admission by the appearance of several episodes of hemoptysis with a stabbing pain of the side stitch type. All are evolving in a context of apyrexia and deterioration of the general state; anorexia, and weight loss. What motivated him to consult a pulmonologist who requested a radiological assessment and sent it to us for further support.

The clinical examination showed a conscious patient; with normal blood pressure at 8/13 mmHg. On the respiratory level, this patient had a respiratory rate at 14 cycles/minute, with no cyanosis and no signs of respiratory distress; otherwise, he presents a digital hypocratism, with pitting lower limb edema. The pleuro-pulmonary examination has shown a normal breath sound with the good transmission of vocal vibrations. The rest of the examination did not show any peculiarities apart from bad oral health and a lumpy lesion of the eyelid surmounted by telangiectasias which measure 1cm of the long axis.

Following the clinical examination, a chest x-ray (Fig 1) was requested and has shown a supra-hilar opacity in the right hemithorax with irregular shape and spiculated borders. Otherwise, it has shown the following features:

- Absence of left aortic contour.
- A tracheal bowing to the left at the level of the right aortic arch with a right.
- A right-sided descending aorta.
- With opacity depending on the aorta on the upper mediastinum.

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After finding all these features on the chest X-ray, a chest angio CT-scan was indicated and has shown the following features:

- Parenchymal window:
  - A spiculated well-defined mass heterogeneity enhanced after contrast medium administration.
  - This mass invades the upper lobe bronchus and is surrounded by micronodular infiltrates.

- Mediastinal window:
  - An aortic cross and descending aorta located in the right of the trachea (fig 2).
  - An aberrant subclavian artery is dilated in its proximal segment (fig 3 and 4).

Discussion

Right-sided aortic arch is a type of aortic arch variant characterized by the aortic arch coursing to the right of the trachea. This variant is rare and occurs in 0.01 to 0.1% of the general population (1). Among the proposed classifications based on anatomical distribution of the involved structures, the most widely used is Edwards classification. Three types of right aortic arches have been described: (2)

- type I: when the big arteries branches form a mirror-image;
- type II: with artery segment enclosing area
- type III: when the isolated left subclavian artery communicates with the pulmonary area through the artery duct.

Type 2 is a right-sided aortic arch with an aberrant left subclavian artery associated with a Kommerel diverticulum. This diverticulum is a bulb-like swelling of the proximal portion of an aberrant left subclavian artery adjacent to its aortic origin (4). In this variant, the left common carotid artery arises first, followed by the right common carotid, right subclavian, and then left subclavian arteries.

The embryological development of the aorta begins during the second week of gestation and is completed by the seventh week. Between the fourth and fifth weeks of embryonic life,
blood leaves the heart by a single vessel (i.e. the truncus arteriosus), which divides into two branches named the ventral and dorsal aortae, respectively. The ventral aortae are connected with the dorsal aortae by six branchial vessels, called aortic arches. These latter are numbered from cephalad to caudal and normally develop into the thoracic aorta and branches. If the left fourth arch disappears and the right one persists, a right aortic arch develops; in this condition, an aberrant left subclavian artery arises either as the last branch of the right-sided aortic arch or from an aortic diverticulum, such as the Kommerell Diverticulum, which results from reabsorption of the left fourth aortic arch proximal to the origin of the left subclavian artery. [5]

Various congenital cardiac anomalies are associated with aortic arch anomalies, including Tetralogy of Fallot, pulmonary stenosis, tricuspid atresia, and truncus arteriosus. These are present in 5% to 10% of type II. (6)

Most patients with right-sided aortic arch with Kommerel Diverticulum are asymptomatic unless aneurysmal disease develops. Moreover, the Kommerel diverticulum aneurysm may result in compression of mediastinal structures (especially the trachea and the oesophagus), causing symptoms such as dysphagia, dyspnea, stridor, wheezing, cough, recurrent pneumonia, obstructive emphysema, or chest pain [7].

Imaging, especially angio-CT scan and angio-MR, are the best explorations methods for those variants, giving a 3D representation of these variants and exploring its complications (dissection; thrombosis...)

In our case, the right-sided aortic arch with a Kommerel diverticulum is associated with lung cancer. To our knowledge, only L.Faggioni and al [6] have found this association with a non-small-cell lung cancer carcinoma. Therefore, we can advance the hypothesis that chronic compression of the tracheobronchial tract could be a factor in cancer development. However, no evidence could be admitted, especially since our patients are chronic smokers with another risk factor.

The key surgical indication occurs when the Kommerel diverticulum presents with a diameter greater than 5 cm in symptomatic patients; in such a situation, complications such as tracheomalacia, oesophageal dilation, or rupture of the aneurysm may occur, and surgical treatment is indicated. [7]

Conclusion

Right-sided aortic arch with Kommerel diverticulum is a rare variant that is more often asymptomatic but can have some complications (compression of mediastinal structures, dissection, and thrombosis). Therefore, imaging plays a major role in detecting and characterising those congenital anomalies.

References

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