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Aneurysm of the aberrant right subclavian artery – a case report

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Summary

Background:

The right subclavian artery, originating not from the brachiocephalic trunk but directly from the aortic arch, is a rare anatomical abnormality. 'Arteria lusoria' is the accepted name of the retroesophageal right subclavian artery. Such a vessel location, between the vertebral column and the esophagus, determines its course to the right. This defect may be asymptomatic, found during autopsy or coincidentally during diagnostic procedures. However, it may also be symptomatic. The course of this major blood vessel in the limited anatomical space may cause symptoms of mediastinal organ compression. The aim of this paper was to present two cases of abnormal anatomical course of the right subclavian artery and its aneurismal dilation. In this study, CT scans of the saccular aneurysm of the retroesophageal right subclavian artery were used: of a male patient diagnosed at Euromedic Diagnostics in Olsztyn and of a female patient, from the resources of the Radiological Dept. at MSWiA Hospital in Olsztyn

Case Reports:

An 85-year-old female was admitted to Hospital ER for congestive heart failure decompensation. Her chest X-ray revealed a round mass in the upper right mediastinum. Chest CT confirmed the presence of a saccular aneurysm of the lusory artery, 6.5 cm in diameter, partially filled with thrombotic material. The patient died in hospital from myocardial infarction that was not related to the aneurysm.

A 61-year-old male patient had a chest X-ray which showed a round opacity on the apex of the right lung. The diagnostic process comprised also chest computed tomography. The examination showed an anomalous origin of the right subclavian artery, with aneurysmal dilation and compression of the oesophagus and of the trachea. An intraluminal thrombus was found. The patient remained under observation till the next CT examination, 6 months later.

Conclusions:

The presented rare cases of arteria lusoria aneurysm are not only casuistic reports. They also show the value of modern MDCT diagnostics. Multi detector CT examinations allow for a proper evaluation of the vascular anomalies in mediastinum. The analysis of vascular pathologies and accompanying compression of adjacent organs makes further treatment possible.

Key words:

vascular anomalies • lusory artery • right subclavian artery aneurysm • lusory artery aneurysm

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Background

The right subclavian artery arises from the bifurcation of the brachiocephalic trunk at the level of the sternoclavicular articulation. Travelling upwards and then laterally the artery forms a bow over the apex of the right lung. It comes out from the upper thoracic aperture over the first rib between the anterior and middle scalene muscles. It is superficially located in the right omoclavicular triangle of the neck. The artery leads down towards the axilla and

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Figure 1. CT axial scan. A saccular aneurism of the lusory artery, with parietal thrombosis.

changes its name at the level of first rib to the right axillary artery.

One of the congenital, ring-type vascular anomalies is the right subclavian artery originating directly from the aortic arch as the last arterial branch, with its course in the space between the oesophagus and the spine towards the right upper limb [1,2].

In the course of embryonic morphogenesis, six pairs of pharyngeal arch arteries are developed. The arch of the aorta and the subclavian arteries originating from it are formed from the fourth pair of arches between week 4 and 7 of pregnancy. Disturbances of development of the fourth pharyngeal arch, connected with the separation of the right cervical artery and the right subclavian artery, lead to this anomaly. Local protrusion of the left part of the aortic wall – left Kommerell's diverticulum, may also arise.

Such a course of the right subclavian artery is conventionally named the 'lusory artery'. In the English literature, it is called ARSA - aberrant right subclavian artery. The anomaly is present in 0.2-2% of the general population [2,3]. This anomaly might be an isolated defect or concurrent with other congenital heart defects. As an isolated defect, it is mostly asymptomatic and thus recognised incidentally during investigations or autopsy. The lusory artery forms an incomplete vascular ring and therefore, it seldom causes pressure and dislocation of the oesophagus or trachea [1,2,4]. This defect was first found in an anatomic research at the beginning of the 18th century. In 1794, Bayford was the first to describe the pathological effects of this abnormal subclavian artery course [1,5]. At present, this anomaly is usually diagnosed in patients with complaints in mediastinum, by means of radiological examinations.

Case Reports

An 85-year-old female was admitted to the Emergency Department for decompensated heart failure symptoms.

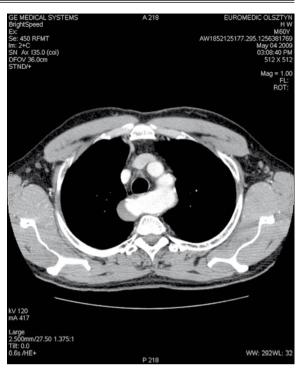


Figure 2. CT axial scan. An aberrant right subclavian artery aneurysm located behind the oesophagus. A parietal thrombus in the aneurism.



Figure 3. CT sagittal scan. An aneurism compressing the posterior wall of the oesophagus and of the trachea.

Her chest X-ray showed a well-defined tumor of the upper right mediastinum and an enlarged **cardiac silhouette**. A saccular, partially thrombosed aneurysm, 6 cm in diameter, was revealed on CT (Figure 1). In the second week of hospitalisation, the patient died of myocardial infarction and pulmonary oedema, which were not related to the arterial aneurysm.

A 61-year-old male was treated in spring 2009 in the department of internal diseases, in the district hospital, for arterial hypertension and paroxysmal atrial fibrillation. An oval opacity on the apex of the left lung was demonstrated on the chest X-ray. An outpatient CT examination showed a strongly calcified sternal end of the first left rib, which gave the opacity in the apex of left lung on the chest X-ray. Moreover, CT showed a vascular anomaly in the upper mediastinum – the right subclavian artery originating from the aortic arch as the last branch. The lamellar calcification of the arterial wall, as well as aneurysmal dilation of up to 25 mm in diameter were also confirmed. Moreover, a parietal, semilunar thrombus, 14 mm wide, was present in the arterial lumen (Figure 2).

The aneurism largely compressed the adjacent upper part of the thoracic esophagus and dislocated it anteriorly together with the trachea (Figure 3).

According to the data collected by the authors, the patient has not been operated on yet and remains under observation with a recommendation for angio-CT in six months' time.

Discussion

Symptomatic anomalies of the aortic arch branches, forming vascular rings, are treated surgically by thoracic surgeons in childhood, due to their congenital character and serious sequelae. Also, any abnormal course of the subclavian artery causing essential ailments and compression deformations within the mediastinum, is treated surgically. The lusory artery may compress not only the esophagus, but also the trachea, and may cause less or more intensive ailments of the respiratory system in childhood, including: dyspnoea, pneumonia, or even a pulmonary emphysema [1,6–8].

Such a defect may also remain silent and give ailments later in life. An incomplete vascular ring of the lusory artery, which compresses or even dislocates the esophagus, causing serious dysphagia, constitutes an indication for operation in adult age [3,5,9–11]. Such an impairment of the esophageal patency, causing malnutrition and, in a consequence, patient's death, was already described by Bayford. It was called 'dysphagia lusoria' and this name has been used till today [1,5].

Nowadays, barium X-ray is performed to diagnose dysphagia. Filling defect observed on examination is caused by the pressure of the abnormal arterial branch. Similarly, the pathological pressure of the oesophagus may be visualised with esophagoscopy. For a full diagnosis of this vascular anomaly, chest CT is used. This examination visualises the course and location of the subclavian artery, allows for the evaluation of the degree of compression on adjacent mediastinal organs, and is able to show the presence of other vascular anomalies.

Complications of this vascular anomaly, such as the aneurism of the aberrant right subclavian artery, have been described very rarely so far. An average size of this aneurism, quoted in the literature, is 3.3 cm (from 2.5 to even 5 cm). An aneurism of this size, located in the upper mediastinum, usually causes ailments and compression on adjacent organs and predisposes to ruptures [12–14]. Due to a lower amount of elastic fibres in comparison to the smooth muscle tissue in the arterial tunica media, the subclavian artery is classified as an artery of muscular type. A progressive degradation of connective tissue fibres, mostly the elastic fibres but also the collagen ones, may lead to aneurism formation.

Resection of the artery through left thoracotomy is a treatment of choice in symptomatic ARSA. Translocation and reimplantation of the artery is recognized as an unrecommended method. Quickly developing modern microinvasive techniques allow for a resection of the ARSA by means of videothoracoscopy. A very short recovery time is an advantage of this access [1].

As the cases of symptomatic ARSA aneurism are very rare, there is not one recommended method of treatment. Surgical procedures are chosen individually for every case. Supraclavicular resection of the right subclavian artery, with its translocation to the right side of the aortic arch, is performed. The resection of the arterial aneurism is performed by left thoracotomy [3,13]. The dissection of the aneurismal basis has been applied as well.

The literature reports on patients treated with a translocation and revascularisation of the lusory artery from supraclavicular approach and on endovascular exclusion of aneurisms with a ortic stent-graft [15,16].

Conclusions

Vascular anomalies such as the *arteria lusoria* are rare but well-known and described in the literature. They were first described in 18th century, basing on autopsy observations. Aneurisms of the lusory artery are very rare. Casuistic reports on this pathology emphasize its incidental character. Individual cases come from large groups of patients of thoracosurgical clinics, observed for many years. Despite the above mentioned facts, the presented cases of ARSA aneurism show a very high efficiency of the contemporary radiological diagnostic methods.

Computed tomography of the chest allows not only to visualise a vascular anomaly of the arterial branches of this area, but also to analyse a potential pathology in these vessels. The above presented examination showed not only the diameter of the aneurism but also its atherosclerotically changed wall. Moreover, the performed spatial reconstruction of the arterial aneurism allowed to diagnose the compression and dislocation of adjacent organs.

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