CT APPEARANCE OF THE ABERRANT SUBCLAVIAN ARTERY

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ABSTRACT

The aim of this study was to characterize aberrant right subclavian artery (ARSA) on chest Computed Tomography (CT). The results are obtained from a review of 328 patients who were scanned for CT chest examination with different complications. ARSA was seen in 5 (1.5%) of 328 study group. It was identified in one (0.6%) of 174 male and four (2.6%) of 154 female patients. All five patients have no symptoms of lusoria, respiratory distress or dysphagia. The ARSA was within normal diameter (mean 8.1±3.9) throughout its course and wider than 9 in its origin. Correlation of the ARSA and gender showed that females were affected more than males significantly. Familiarity with the normal CT appearance of the great blood vessels can be helpful in differentiating an aberrant subclavian artery in upper chest.

KEYWORDS: CT, Aberrant Subclavian Artery, Upper Thorax

Computed tomography (CT) has become a principal imaging method for the assessment of thoracic vascular anomalies. The advantages of CT angiography in comparison with digital subtraction angiography; are that it is a non-invasive technique and it enables complete assessment of the vascular and cardiac anomalies, and their spatial relationships with adjacent organs within the same study (Gilkeson et al., 2003; Lee et al., 2004).

There are three arteries that arise from the arch of the aorta, those are the brachiocephalic, the left common carotid and the left subclavian arteries, and the extra branch is sometimes the right subclavian artery. The right subclavian artery, if it is the last branch, will be retro esophageal this may be associated with aortic arch abnormalities (Aysel et al., 2009).

The right subclavian artery arises from the descending portion of aortic arch. In such cases the subclavian passes either behind the esophagus or between the trachea and esophagus arteria subclavia dextra lusoria, (ASDL) to reach the right side of the body. This variation was found in the previous studies by (Demos et al., 2004; Raider, 1967).

On radiographic images, the anomalous position; the aberrant right subclavian artery can be mistaken for a calcified lymph node, mass, aneurysm or lymph node on unenhanced images. Familiarity with the most common vascular anomalies helps avoid misinterpretation (Caroline Chiles et al., 1999).

Knowledge of the normal CT anatomy of the aberrant right subclavian artery is important to avoid mistaking an aberrant right subclavian artery for a lesion on cross-sectional imaging and to avoid unnecessary and wrong interventions. The purpose of this study was to determine how often the aberrant right subclavian artery can be identified on chest CT images and to characterize its appearance on Sudanese population.

MATERIALS AND METHODS

This study was done in Modern Medical Center-Khartoum Sudan and The Ribat University Hospital during the period from 2008 up to 2011.

CT machine.

Dual CT scanner GE with gantry specifications of: Aperture of 65cm, tilting ±20°, focus iso center is 541mm and focus to detector is 949 and rotation speed 360 in the range between 1.0 -5.0 seconds and X-ray tube specifications : focal spot of 0.7mmX0.6mm ,slice thickness options (0.6,1.0,2.0,3.0,5.0,7.0 and 10.0mm) and scan mode 0.75:1/1.5:1 ,matrix 256X256 ,mA 60-160,Kv 120-140 .Siemens SOMATOM Sensation 16 multislice helical CT scanner was also used . Aperture of 70cm,maximum scan field of view 50-70 cm, slice width for axial scans is 0.6-10 mm.60 KW generator,5.3 MHU tube, gantry rotation time 0.42 seconds and is capable of imaging
RESULTS AND DISCUSSION
Identification and Characterization of aberrant right subclavian artery (ARSA)

The (ARSA) was identified in five (1.5%) of 328 study group. The aberrant right subclavian artery was identified in one (0.6%) of 174 male patients and four (2.6%) of 154 female patients.

It was noticed that for each of the identified right aberrant subclavian artery it was dilated in its origin and trachoesphageal retro-position with upward ascending to the right side of the body as well as encircling trachea and esophagus was detected figure,1 and figure,2. By analyzing the patient's images, it was revealed that the aberrant right subclavian artery was within normal diameter (mean8.1±3.9) throughout its coarse and larger in its origin than 9.0.The correlation between the presence of the aberrant right subclavian artery and gender showed that females were affected more than males.

The left aortic arch with ARSA is the most common aortic arch anomaly, with a reported incidence of 0.52% (Lee et al., 2004) . In this anomaly, the right carotid artery arises as the first branch directly from the aortic arch. An ARSA takes its origin from the descending aorta at a distal point to the left subclavian artery, instead of arising from the innominate artery, and crossing the mediastinum from left to right passing behind the esophagus and trachea (Lee et al. 2004). This what was found in this study because it was located right to the esophagus or encircling the esophagus and trachea ,This was demonstrated at axial CT at the level ofT2.

The aberrant subclavian artery may be associated with other cardiovascular anomalies. An ARSA is associated with coarctation of the aorta, patent ductus arteriosus and intracardiac defects, (Lee et al. 2004) Where as aberrant left subclavian artery (ALSA) may be associated with tetralogy of FallOut, atrial septal defect (ASD), ventricular septal defect (VSD)or coartation of aorta (Stewart et al., 1964). In the present; study; none of these anomalies were registered in all of the five patients with identified aberrant right subclavian artery, and no lusoria, respiratory distress, dysphagia or other associated symptoms were detected. This can be justified as that the
Figure 1: [A,B, C,D] Contrast-enhanced axial CT scan of chest for 76-year-old woman show aberrant subclavian artery encircling the esophagus and trachea (arrows)

Figure 2: Contrast-enhanced axial CT scan of chest for 62-year-old woman shows aberrant subclavian artery (A) right to the esophagus. (B) encircling the esophagus and trachea (arrows)
artery was not pressing on the esophagus from behind which allows the occurrence of compression. Although patients having large arteries retroesophageally, but no respiratory distress or dysphagia have been noted, symptoms arise only if the flexible trachea and esophagus are hindered from being bent forward at the crossing with the retro-esophageal vessel. Symptoms can occur when the right and left carotid arteries arise together or close to each other from the aortic arch, this also was mentioned in previous studies (Goldbloom, 1922; Holzapfel et. al, 1899, Adrianus Klinkhamer 1966). This was not presented in the present cases hence all the subjects do not complain of any similar symptoms.

CONCLUSION

Axial chest CT angiography is non invasive technique and is able to display the detailed anatomy of the vascular structures and relationships with adjacent organs.

Recognition of aberrant subclavian arteries has clinical significance since they may be associated with different clinical symptoms and be accompanied by other vascular and cardiac anomalies. In patients with unexplained dysphagia, aberrant subclavian arteries should be considered and surgery should not be delayed in order that serious complications can be avoided.

REFERENCES


