VERTEBRAL ARTERIES ON CT OF THE CHEST

Dawar Burhan, Ishtiaq Chishti, Zishan Haider, Farhan Ahmed, Mirza Amanullah Beg, Ijaz Memon

Department of Radiology, Aga Khan University Hospital, Karachi, Pakistan.

PJR April - June 2008; 18(2): 42-43

ABSTRACT

Introduction: Knowledge of the superior mediastinal course of the vertebral arteries is important for radiologists who evaluate chest CT, particularly in the setting of trauma, when planning a percutaneous interventional procedure or for pre-operative planning. Our aim was to determine how often the vertebral arteries could be identified on chest CT studies. **Methods:** Contrast enhanced chest CT studies from 50 consecutive patients were reviewed, with specific attention to the vertebral arteries in the superior mediastinal and thoracic outlet regions. **Results:** The average diameter of left vertebral artery was 3mm and it is seen in 43 of 50 (85%) patients. The average diameter of right vertebral artery was also 3mm and it is seen in 38 of 50 (76%) patients. Non-visualization of a vertebral artery was usually owing to proximal venous occlusion with extensive collateral vessels in the expected location of the vertebral arteries, local lymphadenopathy, poor contrast bolus technique or local beam hardening artifact. **Conclusion:** Radiologists need to alert surgeons planning for vascular surgery in the region of the vertebral arteries. It is also important to note that a left vertebral artery was not identified on chest CT in 15% of patients.
KEY WORDS: Vertebral artery, CT scan, anatomy

Introduction

Aorta has been extensively evaluated by conventional angiography in setting of trauma. Computed tomography scanning of the great vessels in the setting of trauma has recently received attention.[1] CTA is now commonly used as the primary imaging approach to rule out blunt aortic trauma (BAI).[2] Some authors advocate dedicated CT angiography of the great vessels of the neck in specific cases of neck trauma.[3] However, the appearance of the vertebral arteries on a standard chest CT has not previously been well described to our knowledge. In trauma patient when vertebral artery is suspected to injure then it is important to know the exact location of the superior mediastinal portion of the vertebral arteries for pre-operative surgical planning.[4] The purpose of this study was to describe the normal CT appearance of the vertebral arteries on standard chest CT, including their frequency of visualization in a clinical population.

Correspondence : Dr. Dawar Burhan Khan
Department of Radiology,
Aga Khan University Hospital,
Stadium Road, P.O Box 3500, Karachi, 74800
Pakistan. Tel. No. 4930051- Ext 2020
E-mail: dawar.khan@aku.edu

Materials and Methods

Fifty consecutive helical chest CT studies performed over a 4-months period were retrospectively reviewed by a two radiologists in consensus. All studies were performed on a Toshiba Aquilion 64 CT unit and utilized bolus administration of intravenous contrast medium by power injection. Dedicated imaging of the chest was performed by using 7 mm collimation and a pitch of 1:1.5. Intravenous contrast medium was injected at an infusion rate of 2 ml/s for a total of 100 ml with imaging initiated 30s after the beginning of contrast medium injection. Soft tissue windows were reviewed for all studies, with a window width of 400 Hounsfield units and a level of 40. All imaging was performed to include the lung apices. As all scans were performed with a field of view to include the entire chest, the thoracic location of both vertebral arteries was included in every case. Origin, proximal part and diameter of both vertebral arteries were recorded on Performa. Non visualization of vertebral arteries was also assessed.

Results

The average diameter of left vertebral artery (Fig. 1) was 3mm and it is seen in 43 of 50 (85%) patients. The average diameter of right vertebral artery was also 3mm and it is seen in 38 of 50 (76%) patients. Non-visualization of a vertebral artery was usually owing to proximal venous occlusion with extensive collateral vessels in the expected location of the vertebral arteries, local lymphadenopathy, poor contrast bolus technique or local beam hardening artifact.

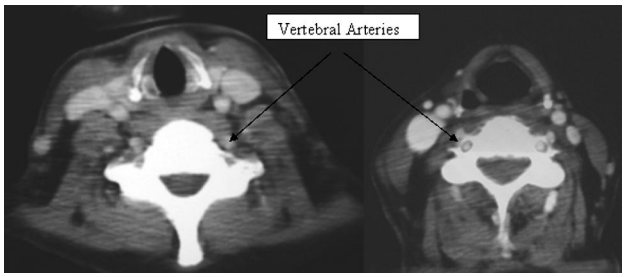

Figure 1: Vertebral artery before & after entering foramina transeversum

Discussion

Left vertebral artery is visualized in majority of patients in routine chest CT scan. Non visualization is most commonly is due to proximal venous occlusion, local lymphadenopathy, beam hardening artifact and poor contrast bolus technique. Although the angiographic literature indicates that the left vertebral artery is the same size or larger than the right in approximately 75% of patients.[5] There was no detectable size difference in our study. Our sample size was small and probably insufficient to detect minimal size differences. After introduction of multi-slice CT scanning, role of CT angiography is an important tool for assessment of arterial anatomy. Good CT knowledge of chest and lower neck arteries is mandatory to understand the course of the thoracic portions of the vertebral arteries on chest CT in neck and superior mediastinal trauma, motor vehicle accidents, evaluation of gross bleeding or a penetrating injury, post-traumatic pseudoaneurysm or fistula, planning for percutaneous superior sympathetic ganglia blocks to avoid placement of the needle into a vertebral artery. Up to 15% of patients vertebral artery may not be visualized on left side which needs if indicated further additional imaging.

Conclusion

Radiologists need to alert surgeons planning for vascular surgery in the region of the vertebral arteries. It is also important to note that a left vertebral artery was not identified on chest CT in 15% of patients.

References

1. Mirvis SE, Shanmuganathan K, Miller BH, White CS, Turney SZ. Traumatic aortic injury: diagnosis with contrast-enhanced thoracic CT—five-year experience at a major trauma center. Radiology 1996; **200:** 413–22

2. Downing SW, Sperline JS, Mirvis SE, et al. Experience with spiral computed tomography as the sole diagnostic method for traumatic aortic rupture. Ann Thorac Surg 2001; **72 :** 495-502

3. Rogers FB, Baker EF, Osler TM, Shackford SR, Wald SL, Vieco P. Computed tomographic angiography as a screening modality for blunt cervical arterial injuries: preliminary results. J Trauma 1999; **46:** 380–5

4. Gavant ML, Menke PG, Fabian T, Flick PA, Graney MJ, Gold RE. Blunt traumatic aortic rupture: detection with helical CT of the chest. Radiology 1995; **197:**125–33

5. Osborne AG. Introduction to cerebral angiography. Philadelphia, PA: Harper and Row, 1980: 35