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Editorial

Multidetector Computed Tomography: One-Stop-Shop Imaging Modality for Evaluation of Vascular Rings

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Vascular rings are a group of congenital aortic arch anomalies in which the trachea and esophagus are partially or completely surrounded by vascular structures. Patients with vascular rings may present with breathing or feeding difficulties.

Although the barium esophagography can exclude the vascular ring, the direct visualization of the thoracic aorta is not possible [1]. Echocardiography can provide a good depiction of the mediastinal vessels and associated cardiovascular malformations. However, it is limited in patients with poor acoustic windows, and visualization of the trachea and esophagus can be difficult or impossible. Catheter angiography is invasive and does not have tomographic or multiplanar capability [1].

Both multidetector computed tomography (MDCT) and magnetic resonance imaging (MRI) can provide tomographic images of the thoracic vessels and airways in patients with the vascular rings. The advantages of MDCT are fast scanning times and high spatial resolution [2]. The major drawback of MDCT is its use of ionizing radiation. Nevertheless, application of dose reduction strategies, such as the lowest possible voltage (eg, 80 kVp), the lowest possible amperage (eg, weight-based milliampere seconds), the minimum amount of coverage, non-gated acquisitions, and single-phase examinations, may significantly decrease the radiation burden. The main advantage of MRI is the absence of radiation exposure. The major drawback of MRI is long acquisition times, and therefore the scheduling and anesthesiology support may be cumbersome in pediatric MRI practice [3].

MDCT also enables the most comprehensive evaluation of airway and lung parenchymal abnormalities and anomalies. Two-dimensional and three-dimensional reconstructions generated from contrast-enhanced MDCT scans are usually of higher quality than those produced from MRI data (Figure 1). Furthermore, some authors suggest that MDCT with three-dimensional reconstructions provide a superb surgical road map, whereas the quality of MR images is often insufficient to be useful for preparing a surgical intervention [4].

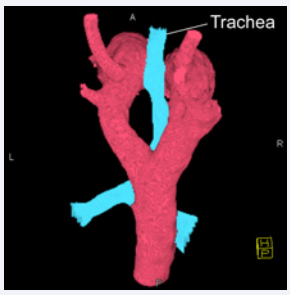

Figure 1 Right aortic arch with aberrant left brachiocephalic artery in 3-month-old boy. 3D volume-rendered reconstruction demonstrates moderate compression of the trachea within the vascular ring.

MDCT is currently becoming a "one-stop-shop" diagnostic imaging modality of choice for evaluation of vascular rings in children and adults. Accurate diagnosis of vascular rings depends on understanding of optimal MDCT technique, postprocessing imaging technique, and characteristic CT imaging appearance of these lesions as well as associated abnormalities [2].

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