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Ultrasonographic imaging of the cervical thoracic duct

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Blood and lymphatic vessels develop in a parallel, but independent manner, and together they form the circulatory system, allowing the passage of fluid and delivering molecules within the body. Although the lymphatic vessels were discovered already 300 years ago, the same time blood circulation was described, the lymphatic system has remained relatively neglected until recently[1]. Identification of lymphatic vasculature is crucial, especially in patients after Glenn or Fontan procedure. Thrombosis of cervical veins can lead to lymph flow obstruction, resulting in plastic bronchitis, chylothorax and protein losing enteropathy. Imaging of the lymphatic system is very difficult due to the small diameter of lymphatic vessels. Both classical and MRI lymphangiography are a burden for the patient due to their invasive nature and the need for contrast agent. Ultrasonography represents an available, non-invasive method that allows to visualize the cervical portion of the thoracic duct (TD). Other parts of lymphatic vessels are unattainable with ultrasound. The TD drains the lymph from the lower part of the body into the large left-sided cervical veins or, less commonly, other sites such as the innominate vein or the right internal jugular vein. In 95% of cases with a left-sided TD, the lympho-venous junction occurs at or near the junction of the left internal jugular and the left subclavian vein (jugulo-subclavian angle) (Fig. 1). Occasionally, the TD may display two or more junctions with the veins. The TD is separated from the venous system by a bicuspid valve to prevent the flow of venous blood into the duct (Fig. 2). On gray scale ultrasound, lymph flow manifests as bursts of hyperechoic signals during expiration (Fig. 3). This makes the detection of lymph flow from the duct to the vein possible without the need for contrast agent. Kochilas *et al*. found that patients expected to have increased venous pressures had larger TDs, consistent with the known sensitivity of lymph production with rise in hepatic venous pressures; however the measurements obtained in patients with failing Glenn or Fontan circulation were all above the mean thoracic duct diameters reported in healthy adults: 2.5 mm. Probably the received diuretics affected the size of the thoracic duct[2].

On the other hand, US-guided puncture of the cervical TD represents an alternative method of cannulation for thoracic duct embolization[3]. Hraska developed an alternative treatment approach for Fontan patients with protein losing enteropathy based on the decompression of the TD to the lower pressure levels of the common atrium with a concomitant increase of preload. The TD is decompressed by diverting the innominate vein directly to the common atrium[4]. Identification of the lympho-venous junction is essential for this type of procedure. Therefore, ultrasonography of the TD can play a key role in visualization of the TD due to its non-invasive character.

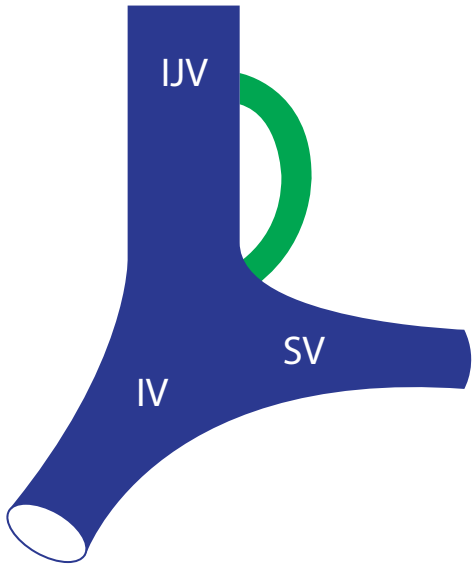

Fig. 1. *Anatomy of the jugulo-subclavian angle. Green vessel represents the thoracic duct. IV – innominate vein, IJV – Internal jugular vein, SV – sublavian vein*

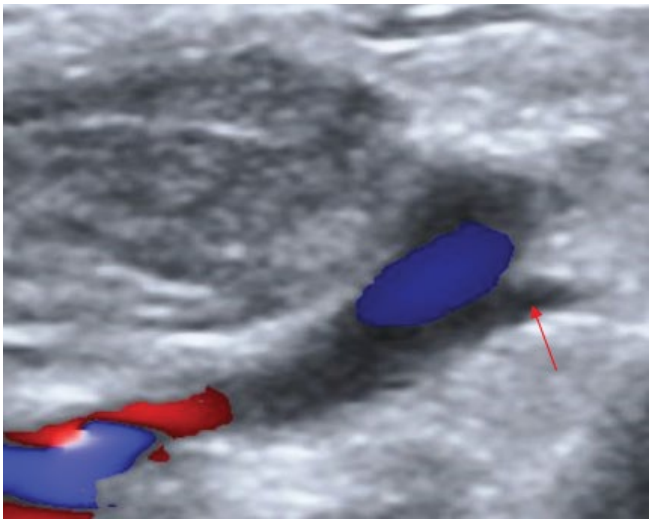

Fig. 2. *Ultrasonography of the jugulo-subclavian angle. Thoracic duct (red arrow)*

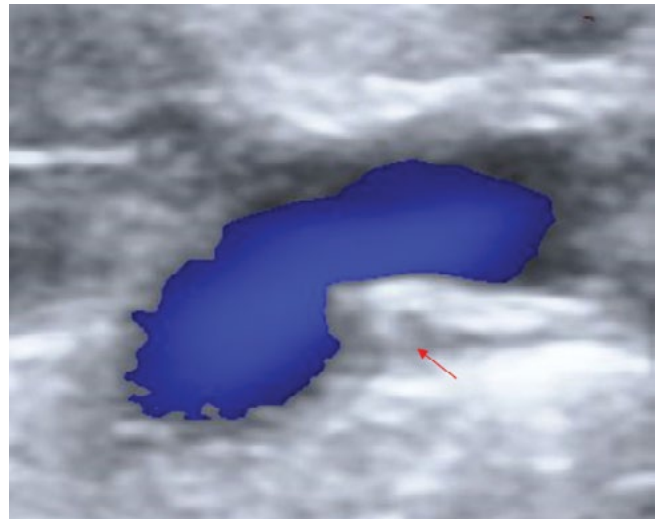

Fig. 3. *Ultrasonography of the thoracic duct. Thoracic duct (red arrow)*

Conflict of interest

The author declared no potential conficts of interest with respect to the research, authorship, and/or publication of this article.

Ethical statement

All applicable institutional and/or national guidelines for the care and use of animals were followed.

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