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Case Report

External jugular vein passing through triangle formed by tendon of cleido-occipitalis cervicalis muscle, trapezius muscle and clavicle — a case report

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Abstract

A rare case of variation was found in a South Indian female cadaver of about 40 year of age, during routine dissection of neck region for undergraduate students at Melaka-Manipal Medical College, Manipal University, Manipal. Trapezius muscle on right side of neck presented a rare variation called cleido-occipitalis cervicalis. The variant muscle was a separate part of trapezius and was inserted on the posterior surface of clavicle at the junction of its medial one third with the lateral two thirds. The right external jugular vein was bifid and reunited, then passed between the tendon of cleido-occipitalis cervicalis muscle and clavicle, finally draining into the right suprascapular vein. This unique anatomical position of external jugular vein may lead to its impingement during certain actions of trapezius muscle. Trapezius muscle and external jugular vein of left side did not show any unusual presentation except that the left external jugular vein drained into left internal jugular vein. These variations are important as the external jugular vein is routinely used in catheterization for diagnostic or therapeutic purposes, as well as in port implantation and transjugular intrahepatic porto-systemic shunts or selective venous sampling. Probable embryological cause of the variation has also been explained.

Key words [external jugular vein] [internal jugular vein] [trapezius] [cleido-occipitalis cervicalis]

Introduction

The venous drainage of head and neck is divided into superficial and deep jugular systems. The deep jugular system consists of internal jugular vein and the superficial system consists of external and anterior jugular vein. External jugular vein is formed by the union of the posterior division of retromandibular vein and the posterior auricular vein below the ear in the substance of parotid gland [1]. It then passes superficial to sternocleidomastoid muscle and pierces the investing layer of deep cervical fascia 2.5 cm above the midpoint of clavicle and finally drains into subclavian vein [2]. External jugular vein is used in various procedures like transjugular liver biopsy, catheterization for hemodialysis, etc. Therefore any variation in external jugular vein should be kept in mind by the surgeons, radiologist, plastic surgeons. On the other hand, trapezius is a muscle of back forming the posterior boundary of posterior triangle of neck and is supplied by spinal accessory nerve.

Case Report

During routine dissection of a South Indian female cadaver of about 40 years of age in our medical college, we found a rare combination of variation of external jugular vein on both side of neck and trapezius muscle on the right side. Externally the neck region was intact and normal without any visible abnormalities, mass or surgical scars. The right external jugular vein was formed as usual by joining of posterior division of retromandibular vein with posterior auricular vein at the level of angle of mandible and then it bifurcated opposite to the sternocleidomastoid muscle, descended for 6 cm and reunited again well below the sternocleidomastoid muscle in the posterior triangle of neck. No structure was passing between the bifurcated veins. The vein then pierced the deep cervical fascia above the clavicle, passed between the tendon of cleido-occipitalis cervicalis muscle, trapezius and the clavicle, and then drained into the right suprascapular vein at right angle (Figures 1, 2). Suprascapular vein was large and drained into subclavian vein. The left external jugular vein was normal except that it was draining into internal jugular vein (Figure 3).

In the same cadaver, the trapezius muscle on the left side was as usual, but on the right side trapezius muscle had a variant portion. Some portion of muscle fibers of right side trapezius (upper/occipital fibers) near clavicle got separated and continued as a separate tendon. This tendon inserted on posterior surface of clavicle at junction between medial one

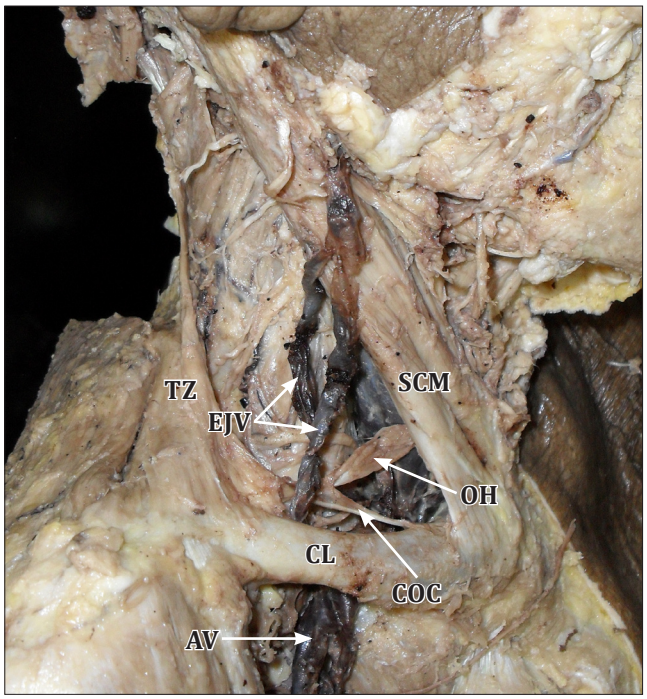

Figure 1. Dissection of right posterior triangle of neck showing the external jugular vein passing through triangle formed by clavicle, cleido-occipitalis cervicalis muscle and trapezius muscle. *(**TZ**: trapezius muscle; **SCM**: sternocleidomastoid muscle; **EJV**: external jugular vein; **COC**: cleido-occipitalis cervicalis muscle; **OH**: omohyoid muscle; **AV**: axillary vein; **CL**: clavicle)*

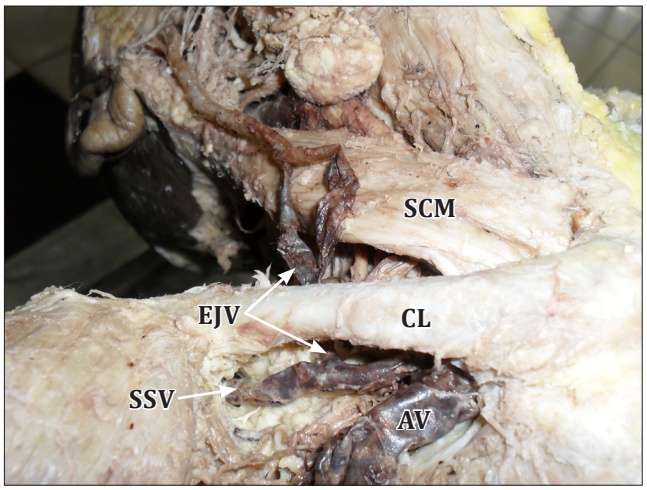

Figure 2. Dissection showing right external jugular vein draining into suprascapular vein. *(**SCM**: sternocleidomastoid muscle; **EJV**: external jugular vein; **AV**: axillary vein; **SSV**: suprascapular vein; **CL**: clavicle)*

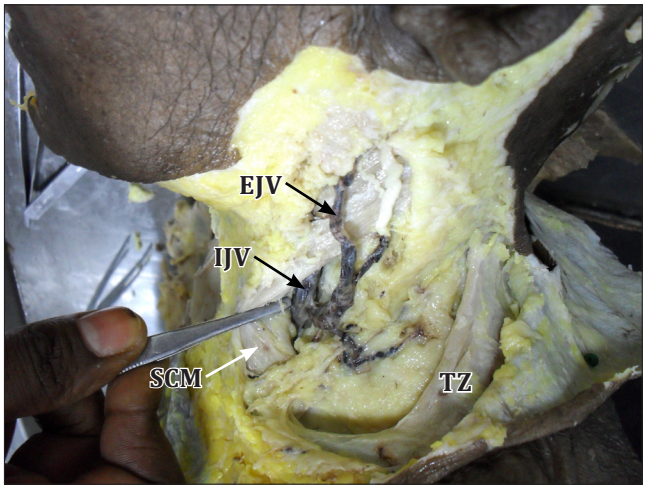

Figure 3. Dissection of left posterior triangle showing left external jugular vein draining into internal jugular vein. *(**TZ**: trapezius muscle; **SCM**: sternocleidomastoid muscle; **IJV**: internal jugular vein; **EJV**: external jugular vein)*

third and lateral two third. The muscle fibers of the variant muscle originated from the medial part of the superior nuchal line. This aberrant muscle resembled to the cleido-occipitalis cervicalis portion of trapezius. Thus the variant muscle and tendon found may be termed as the 'cleido-occipitalis cervicalis'. It measured about 8 cm in length and was supplied by branch of spinal accessory nerve (Figure 1). The external jugular vein passed through the triangle formed by the cleido-occipitalis cervicalis, trapezius and clavicle. As the vein passes between the tendon of cleido-occipitalis cervicalis and clavicle, it may get compressed during certain actions of the trapezius muscle as in rotation and elevation of scapula.

Discussion

Variation of external jugular vein has been reported frequently. Duplication of external jugular vein is rare and has been reported earlier by Comert and Comert [3]. Till now there has been no report of external jugular vein ending into suprascapular vein at right angle.

External jugular vein is developed from the postero-superior part of the venous ring of jugulocephalic vein (cephalic vein) which is present around the developing clavicle when the embryo is about 22 mm long [4].

Most of embryonic veins arise as capillary plexus which anastomose with each other and latter fuse and enlarge, giving rise to fewer and larger veins. Thus new vein appear with subsequent atrophy and replaced by other veins [5], during which one of the venous channel persists even when the other evolves and thus the external jugular vein may have remained doubled in a small segment. The presence of variant muscle in the region must have caused the lower part of external jugular vein to shift and develop laterally, making it to drain into the suprascapular vein at right angle and thus pass between the variant muscle, trapezius muscle and clavicle.

Trapezius is a muscle of the back. Variations of trapezius muscle have been mentioned earlier also. Rahman and Yamadori reported about cleido-occipitalis muscle which he

mentioned to be a result of anlage degeneration and abnormal segregation of a part of trapezius muscle [6].

Tomo et al. reported about cleidocervical muscle [7]. Nagashima et al. also described about cleido-occipitalis and cleidocervicalis muscles [8]. But all these variations are slightly different from the present case in term of attachment of variant muscle and also from the developmental aspect.

Trapezius and sternocleidomastoid muscles are developed from thick columnar mass derived from brachial mesoderm and adjacent myotomes, which divides into dorsal part forming trapezius muscle and ventral part forming sternocleidomastoid muscle. Trapezius is a compound muscle having three distinct portions, among which the clavicular portion is associated with cleido-occipital element of sternocleidomastoid muscle in lower mammals and therefore this portion can be termed as cleido-occipitalis cervicalis portion of trapezius muscle [9]. Kwak et al. mentioned a case of cleido-occipitalis cervicalis for first time, but no structure was compressed or trapped by the variant muscle [9]. As the variant muscle fibers in our case originated from medial part of superior nuchal line and inserted near to the cleido-occipital portion of sternocleidomastoid muscle, it can be considered as variant of cleido-occipitalis cervicalis. This portion of variant muscle probably got isolated during the separation of trapezius and sternocleidomastoid muscle anlage and remained separated instead of joining with the main muscle mass of trapezius. External jugular vein developed laterally to the variant muscle and got dragged laterally leading to its entrapment between variant muscle and clavicle, finally draining into suprascapular vein.

Also the left external jugular vein was draining into internal jugular vein of same side. Hollinshead [10] has mentioned that in one third of cases the external jugular vein drains into internal jugular vein. In our case the external jugular vein drained into the internal jugular vein just above the omohyoid muscle.

External jugular vein is used in estimation of central venous pressure, in patients undergoing transjugular liver biopsy, in medico legal aspects, for insertion of permanent catheter for hemodialysis, for intravenous therapy, etc.; making the vein important for clinicians and surgeons performing the above procedures. During rotation, retraction and elevation of scapula, the trapezius along with the variant muscle contracts and may lead to the compression of external jugular vein against the clavicle. As the external jugular vein is draining into suprascapular vein at right angle, this variation may also produce obstruction or resistance for the passage of catheter or cannula or manometer and lead to complication such as perforation of the vein and subsequent bleeding while performing above said procedures. Thus such variation should be kept in mind by surgeons and clinicians.

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