




External Jugular Vein Perforation by the Transverse Cutaneous Nerve of The Neck: A Case Report and Review of The Literature

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Abstract

A very rare anatomical variation of external jugular vein's penetration by the transverse cutaneous nerve of the neck is displayed in the current study. The phenomenon of veins' fenestration or penetration by other structures, such as nerves along with its likely embryologic development are discussed. Moreover, the potential clinical significance of that variation's awareness on behalf the physician is discussed in detail.

Keywords External jugular vein · Penetrated vein · Cadaveric · Transverse cervical nerve

Introduction

As it is known the external jugular vein (EJV) displays only a few variations, such as duplication, phlebectasia, or sacular aneurysm [1–3]. The precise awareness of the likely EJV's variants is crucial for the surgeon of the neck, since that vein is utilized sometimes for central venous catheterization, as graft during carotid endarterectomy or as sole recipient vein in head and neck free flap reconstruction [4, 5].

In the current study, an unreported in the relevant literature, to the best of our knowledge, case of EJV's wall penetration by the transverse cutaneous nerve of the neck (TCNN), is mentioned along with its morphological features, and clinical significance as well.

Case Description

During the routine dissection in our Laboratory of Anatomy, in a 78-year-old formalin-fixed male cadaver an unusual case of EJV's penetration by the TCNN was encountered. In particular, after meticulous dissection of the anterior cervical region on both sides we detected on the right side the ipsilateral TCNN piercing the EJV's anterior wall at the middle one third of the EJV's course and after emerging from the venous wall being distributed on the anterior neck. The cause of cadaver's death was unrelated to the present study. There was no evidence of previous surgical procedures underwent in the region and no other variants of the adjacent anatomical structures were recorded. The current variant was documented by repeated photographs (Fig. 1).

Discussion

As it is widely known the EJV that mostly drains the scalp and face, but also some deeper parts is forming from the union of the posterior auricular and posterior facial veins and after an oblique course, crossing the sternocleidomastoid muscle, ends in the subclavian vein. The TCNN neck arising from the second and third cervical rami runs obliquely forwards, deep to EJV and is dividing into ascending and descending branches that innervate the anterolateral region of the neck [6].

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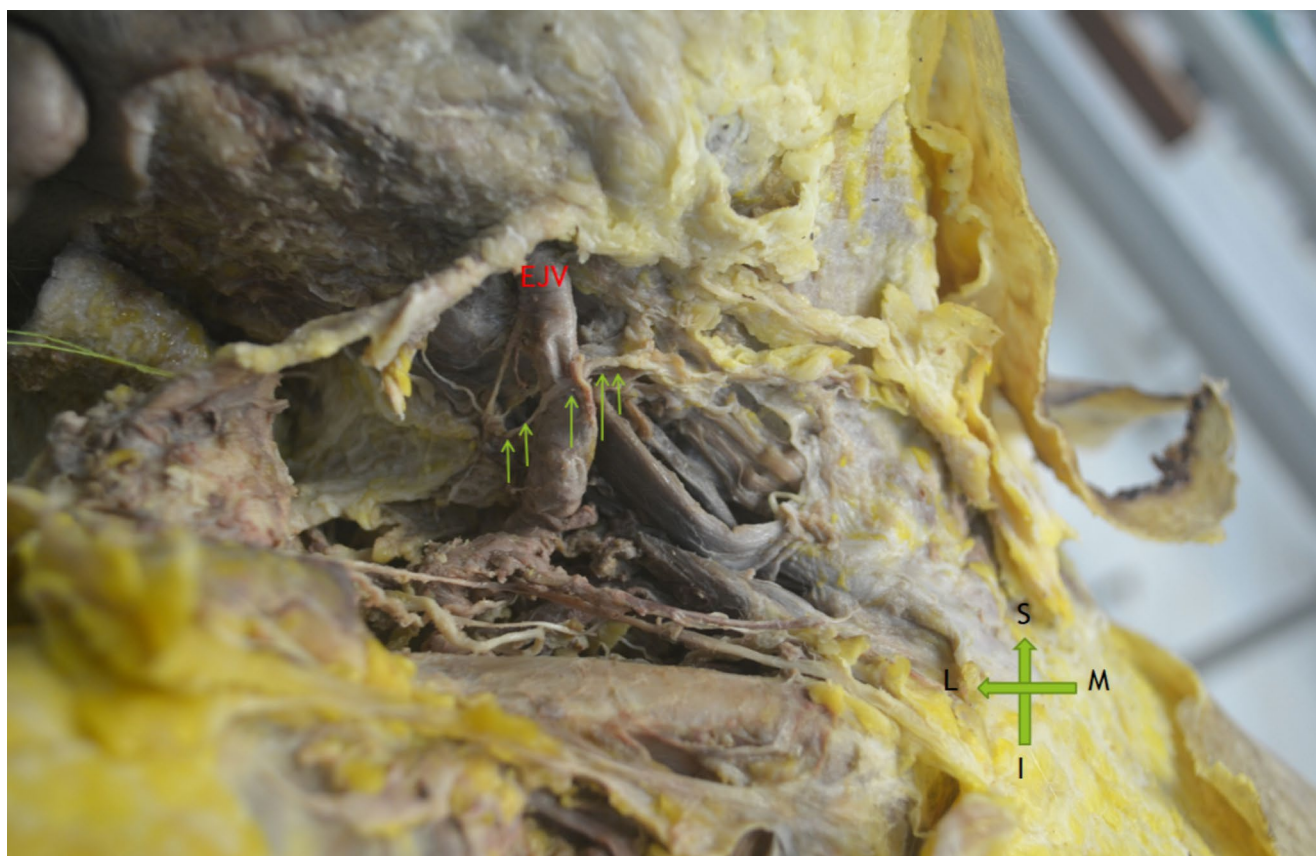


Fig. 1 Dissection of the right half of the antero-lateral neck. Note the right transverse cutaneous nerve of the neck (arrows) piercing the anterior wall of the ipsilateral external jugular vein (EJV), (S: Superior, I: Inferior, L: Lateral, M: Medial)

In the relative literature, there are few data as regards the likely presence of EJV's fenestration. In particular, Cvetko [7] prescribed a case of a fenestrated EJV's segment, 6 cm in length, with the cervical branch of the facial nerve passing through that venous fenestration. Comert et al. [1] mentioned an EJV's fenestration at its middle portion with no anatomical structure passing through that venous ring. The same author in another study detected a case of an EJV's fenestration with a length of 4 cm; that fenestration did not contain any anatomical element [8]. A third case of EJV's fenestration has been prescribed by Snoj et al. [9] in 2013. Interestingly, in our case we observed an uncommon anatomical variant in which the TCNN pierced the anterior wall of the EJV. To the best of our knowledge, such a variation has not been documented previously in the literature.

Certainly, in other veins of the human body, cases of fenestration or penetration of the venous wall have been mentioned. More common cases of fenestrated veins are those of internal jugular veins which are traversed usually by the accessory nerve. Such duplicated or fenestrated jugular veins are occurring in 0.4% or 2.1% or 3.2%. [10–12] Moreover, other veins forming a venous ring, is the retromandibular vein which in an incidence of 3.03% is traversed

by the branch of the facial nerve or the axillary vein that its venous ring is traversed by the medial cutaneous nerve of the forearm [13, 14]. In addition, it has been reported that the accessory phrenic nerve may course through a venous annulus of the subclavian vein [15]. The very rare case of penetration of the wall of a vein by a nerve has been detected by Paraskevas et al. [16] who described a case of a phrenic nerve running obliquely through the anterior wall of the subclavian vein.

The EJV is sometimes doubled. Shima et al. [17] in a cadaveric study noted the presence of an EJV's duplication in 17% of their material, whereas Anastasopoulos et al. [18] prescribed a case of a bilateral occurrence of the EJV. It has been mentioned a case in which EJV was absent [7]. Tubbs et al. [19] mentioned that in some instances the EJV forms a venous ring around the clavicle, whereas Rao et al. [20] noted a case in which the supraclavicular nerve produces a loop around the EJV. The existence of phlebectasia of EJV has been described as well along with a case of saccular EJV's aneurysm that induced neck swelling [2, 3].

As for the embryology's development of a vein duplication, it has been suggested that a dearrangement of the venous plexuses between the 3rd and 5th gestational weeks

may be the cause [21]. As for the mechanisms leading to EJV's penetration by a nerve during the embryological development only speculations may be done.

Finally, EJV is an excellent recipient vessel and however it is not the workhorse in the microvascular free flap reconstruction of the neck, it has gained ground due to the courageous result of the literature. According to notable studies, the survival of the flap is excellent when EJV is recruited [22].

Conclusion

The awareness of the current EJV's variation is crucial for the physician since that vein is utilized sometimes for the estimation of the central venous pressure or as a recipient vein in head and neck free flap reconstruction [4, 5]. In the aforementioned procedures and any other surgical exposure of the anterior cervical region, the EJV could potentially be damaged leading to TCNN lesion and thus hypoesthesia and sensory disturbances in the skin area of the anterior neck. This variation probably does not affect the outcome in central venous measurement, but TCNN is prone to injury during EJV cannulation due to this abnormal course. Every surgery in neck leads to a significant amount of cases with reversible paresthesia, so deep knowledge of every anatomical variation can spare nerve fibers and limit the postoperative paresthesia.

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Declarations

Conflict of Interest All authors declare that there are no conflicts of interest to be reported.

Consent The cadaveric specimen was donated to the Laboratory of Anatomy for researching and educational purposes, therefore no written consent was needed.

Ethical Approval All authors made substantial contributions to the conception and design of the work, the acquisition, analysis, and interpretation of data; and approved the final version of the manuscript. This study is part of a massive project that has been approved by the Aristotle university of Thessaloniki.

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