

ATYPICAL UNILATERAL VENOUS DRAINAGE OF HEAD AND NECK

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ABSTRACT

Background: Unexpected variations of the external jugular veins should be aware in the hope of preventing inadvertent injury.

Aims: The aim of the present study is report a rare and non-reported unilateral anatomical variation of the venous drainage of head and neck.

Materials and Methods: The anatomical variations were found during a routine dissection performed in the laboratory of Morphology of the University of Pamplona.

Findings: The common facial vein had a similar location and course as the EJV. Hence, this vein was termed as the second external jugular vein and drain into the subclavian vein. External Jugular Vein terminated into the jugulosubclavian junction. The external jugular vein presented two fenestrations. The suprascapular vein drains into the external jugular vein. The transverse cervical veins drains into the second external jugular vein

Conclusion: Combination of double fenestration with double external jugular vein and anomalous venous drainage patterns is a rare anomaly.

Key Words: double external jugular vein, double fenestration, common facial vein, anastomotic branch.

INTRODUCTION

According to standard anatomical descriptions, the normal pattern of venous drainage of the head and neck is as follows: (A) the superficial temporal vein unites with the maxillary vein within the substance of the parotid gland to form the retromandibular vein (RMV); The retromandibular vein divides into anterior and posterior divisions before emerging from the apex of the gland; (B) The facial vein crosses the body of the mandible region, superficially to the submandibular gland. Normally, near the angle of the mandible occurs the union between facial vein and anterior division of retromandibular vein with formation of the common facial vein (CFV), which drains into the internal jugular vein (IJV); (C) External jugular vein (EJV) is normally formed by the union of the posterior auricular vein (PAV) and posterior division of the retromandibular vein; 1 (D) The EJV starts at the level of mandible, just below the apex of the parotid gland and runs vertically down in the superficial fascia and crosses the sternocleidomastoid muscle (SCM) from the superficial aspect. It pierces the deep cervical fascia just above the middle of the clavicle and drains into the subclavian vein (SCV). It usually receives the occipital,

posterior external jugular, anterior jugular, transverse cervical veins and suprascapular vein. It collects most of the blood from the exterior of the cranium and deep part of the face.²⁻⁵

The aim of the present study was report a rare anatomical variation of the superficial venous drainage in the right side of the neck whose morphological characteristics has hitherto not been reported.

MATERIALS AND METHODS

This work was previously approved by the Ethics Committee in Research and Environmental Impact of the University of Pamplona, conformed by resolution 030 of January 16 of 2014 and Resolution No. 008430 of 1993 of October 4 of the Ministry of Health of Republic of Colombia, which regulates the scientific, technical and administrative norms for health research. The anatomical variations were observed in the right region of the neck in a 55-year-old male cadaver that was dissected in the Laboratory of Morphology of the University of Pamplona. This work was carried out by routine dissection classes for undergraduate medical students. Topographic details of the variations were examined,

recorded and photographed. Measurements were taken with assistance of a sliding Vernier caliper with an accuracy of 0.01 mm during the course of the anatomical dissection.

FINDINGS

The FV was found to have a normal course in the face. Near the angle of the mandible, it joined with the anterior division of the RMV to form the common FV. Figure 1. The common FV, situated further down in the neck, instead of following the normal course was found to share a similar location and run a similar course as the EJV. Hence, this vein was termed as the second EJV (EJV2). Situated anterior to the EJV, the EJV2 ran vertically downward, and in the posterior triangle, it pierced the deep fascia in front of the inferior belly omohyoid muscle and to 1 cm of the point where the EJV pierced the deep fascia. EJV 2 join the subclavian vein Figure 2 and 3.

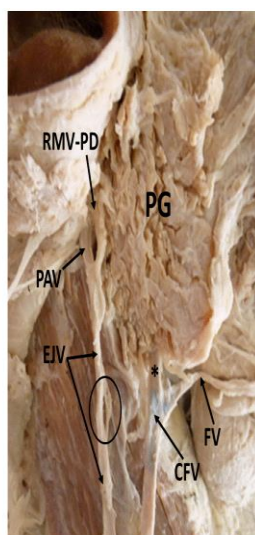


Figure 1. Right side of the neck (upper third). PG: Parotid gland; RMV-PD: retromandibular vein-posterior division; PAV: posterior auricular vein; EJV: external jugular vein; Circle: fenestration of external jugular vein in upper third of the neck; Asterisk: retromandibular vein-anterior division; FV: Facial vein; CFV: Common facial vein.

The EJV was formed by the union of the PAV and posterior division of RMV, outside parotid and behind mandibular angle. Figure 1. EJV was comparatively thinner than EJV2. It showed a normal course until it pierced the deep cervical fascia in the supraclavicular triangle, behind of the inferior belly omohyoid muscle. Figure 2 and 3. After piercing the deep fascia, the EJV turned medially and terminated into the confluence of the SCV and internal jugular vein (IJV) on the same side.

Two anastomotic branches were observed between the EJV and EJV 2, the first to 7 cm and the second to 10 cm, from the angle of the jaw. Figure 3. At the same level of the second anastomotic branch, a common venous trunk formed by transverse cervical veins is observed, this is joined to the EJV 2. Figure 3.

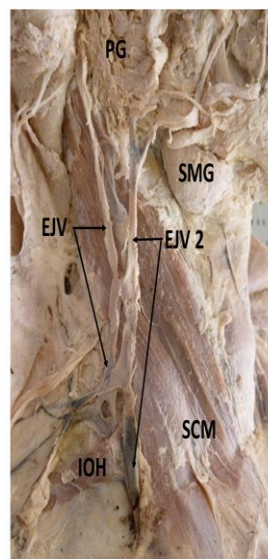


Figure 2. Lateral view of the neck -right side. SMG: Submandibular gland; PG: Parotid gland; EJV: External jugular vein; EJV2: second external jugular vein; SCM: Sternocleidomastoid muscle; IOH: Inferior belly omohyoid muscle.

The EJV presented two fenestrations, one located in the upper third of the neck to 2 cm from the angle of the jaw (The fenestrated segment was 1 cm in length). Figure 1. The second in the lower third of the neck to 11 cms from the angle of the jaw (The fenestrated segment was 0.5 cm in diameter). In this second fenestration, it is noted the formation of a common venous trunk between the EJV and the suprascapular vein (SV), which in turn drained into the jugulosubclavian junction. Figure 3.

On the right side, there was no evidence of formation of occipital, posterior external jugular or anterior jugular veins.

On the left side, the formation and drainage of the veins was as per the classical pattern.

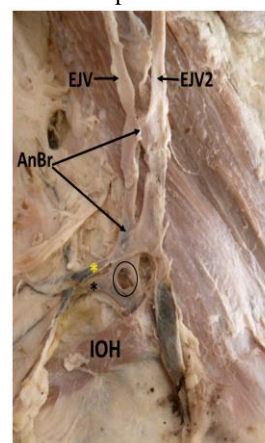


Figure 3. Right side of the neck (lower third). Circle: fenestration of the EJV in the lower third of the neck, IOH: Inferior belly of omohyoid muscle, Black asterisk: suprascapular vein; Yellow asterisk: venous common trunk formed by transverse cervical veins; EJV: External jugular vein; EJV2: Second external jugular vein; AnBr: anastomotic branch between EJV and EJV2.

DISCUSSION

Superficial head and neck veins are known to exhibit various anatomical variations that may affect its tributaries, size, drainage, form, course and termination. The EJV may be absent on one or both sides. In some cases it may be formed by the posterior auricular vein and could receive the facial, lingual or the cephalic vein (CV). In others it could be doubled or form an annulus around the clavicle. Many authors have also reported variations in the course and termination of the CV, which could drain into the internal jugular vein (IJV), the EJV or the basilic vein. 6-8

Deslaugiers et al., examining the termination of the EJV in 50 cadavers, reported that the EJV in 60% of the cases drained into the jugulosubclavian junction; 52% united with the transverse cervical vein to form a common trunk, which in turn drained into the jugulosubclavian junction, while the remaining 8% drained directly into the jugulosubclavian junction without uniting with any other vein. This study also found that the EJV drained into the SCV in 36% of the cases and into the trunk of the IJV in 4% of the cases. 9 In another study was reported that the EJV terminated into the jugulosubclavian venous confluence in a 72%, in the SCV in 26 %, and the IJV in 2% of the cases.10 Fenestration of the EJV is rare, a few cases have been reported. 11-15 All patients were female, and there was no predominant side (right: 2 cases; left: 3 cases). The cervical branch of the facial nerve passed through the fenestration of the EJV in only 1 of the 5 cases. 14 After division of the EJV around the anterior border of or on the sternocleidomastoid muscle, the EJV joined together around the posterior border of the sternocleidomastoid muscle in 4 of the 5 cases (80%). This finding was similar to type 2 of the classification by Shima et al. in which the veins joined around the posterior border of the sternocleidomastoid muscle (type 1 with single EJV: 83%; type 2: 17%). 16

Venous pattern development is a complex process initiated by the formation and eventual regression of the cephalic veins and is associated with the formation of interconnecting venous spaces. Upon further development, the selective retention and regression of some network channels results in a definitive venous pattern. 17 The EJV develops as a secondary channel from a capillary plexus derived from a tributary of the cephalic vein in tissues of the neck and anastomoses secondarily to the anterior facial vein. At this stage, the cephalic vein forms a venous ring around the clavicle from which it connects with the caudal part of the precardinal veins. The deep segment of the venous ring forms the subclavian vein and receives the external jugular vein. Developmental errors during crucial stages of venous formation result in abnormal venous pattern in particular venous channels. 13,18

The EJV is increasingly being utilized for cannulation, assessing venous pressure or intravenous therapies. The inspection, auscultation and Doppler sonographic examination of the venous system jugular may give a clue for the diagnosis of cardiac diseases. Anatomical

variations of the EJV, particularly formation, termination, division or its absence may interfere in those procedures and therapeutic approach. The EJV has also been used to monitor central venous pressure. Estimation of EJV pressure at the fenestrated part of the EJV, as presented in this study, could cause it to be underestimated. The EJV with double segments raises the possibility of the potential for deep venous thrombus formation secondary to changes in flow velocities. 13

The characteristics and anatomical details described in the present case, demonstrates a combination of variations of vein in neck region, and differs from the others reported in the literature.

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COMPETING INTERESTS

None

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CONCLUSION

The presence of anatomical variations in the superficial venous system of the neck may have serious implications for surgical procedures in the head and neck and radiologic examinations. The case presented in the present study alerts clinicians and surgeons performing neck, vascular or reconstructive surgery to prevent inadvertent injury.

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