

**UNUSUAL VENOUS DRAINAGE OF THE HEAD AND NECK.****HUMBERTO FERREIRA ARQUEZ***

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ABSTRACT

Variations in drainage veins of the face and neck are important not only for the anatomist but also surgeon. In view of this significance a total of 13 cadavers with different age groups were used for this study. The head and neck region (26 sides) were dissected carefully and photographed in the Morphology Laboratory at the University of Pamplona. Anatomical variation and unusual pattern of drainage was found in a 75-year-old male cadaver with unilateral absence of external jugular vein. The lingual vein and the superior thyroid vein had transverse venous connections which drained into an arch venous located between the primitive carotid artery and the superior thyroid artery. This arch venous draining above in the common facial vein and down into the internal jugular vein. Knowledge of anatomic and morphologic variations in the superficial veins of the head and neck is essential to carry out successful surgical procedures.

KEYWORDS: Anatomical variations, external jugular vein, internal jugular vein, retromandibular vein, venous arch, transverse venous connections.

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INTRODUCTION

The complex embryological development of the vascular system often results in a myriad of clinically relevant anomalies. A variation in the drainage pattern of the veins of the face has been observed in the past¹⁻³. The standard anatomical description of the veins of the face is of superficial temporal vein uniting with maxillary vein within the substance of the parotid gland to form retromandibular vein. The retromandibular vein divides into anterior and posterior divisions before emerging out from the apex of the parotid gland. The anterior branch joins with the facial vein slightly inferior and anterior to the angle of mandible to form common facial vein that drains into internal jugular vein. While the posterior division unites with posterior auricular vein to form an external jugular vein. It then passes superficially to the sternocleidomastoid muscle and pierces the investing layer of deep cervical fascia 2.5 cm above the midpoint of the clavicle and finally drains into the subclavian vein. It receives blood mostly from the scalp and face, including the deeper parts of these regions. The relevance and importance of varied drainage patterns of the veins of the head and neck warrant attention for their use in surgeries of head and neck involving micro vascular anastomoses⁴⁻⁶. The superficial veins of the neck are used for cannulation, either for intravenous infusion or for central venous pressure monitoring. These venous segments are used for carotid endarterectomies. Hence, a thorough knowledge of the normal anatomy and variations could be useful in performing these procedures. The external jugular vein is used for cannulation to conduct diagnostic procedures or intravenous therapies. The external jugular vein may give a reliable estimate of central venous pressure. During superficial parotidectomy and open reduction of mandibular condylar fractures, the retromandibular vein is used as a guide to expose the facial nerve branches⁶. The practice of modern-day medicine has created new needs. One of these is the necessity for access to the circulation, which is needed in diverse groups of patients. On the one hand are patients with multiple organ failure whose care requires monitoring of vital functions and body chemistry, while at the other end of the

spectrum are those on therapy, such as hemodialysis, home parenteral nutrition and drug infusion. In short, countless lives depend on temporary or permanent access to the circulation. To make an appropriate choice for each patient's needs, the clinician must be familiar with the many veins available. The majority of venous catheters are percutaneously inserted using anatomic landmarks, and the success of their placement depends on the vein being in the expected position, its caliber and patency⁷. Superficial veins of the head and neck are utilised for central venous cannulation, oral reconstruction and parenteral nutrition in debilitated patients. Clinical and sonological examinations of these veins may provide clues toward underlying cardiac pathology. Hence, although variations in these vessels are common, a sound knowledge of such variations becomes clinically important to surgeons, radiologists and interventional anaesthetists. The purpose of this study was to find out vascular variations in the head and neck region. In this paper is described a case of variations venous is not known since it is the first case reported so far in the available literature.

MATERIALS AND METHODS

A total of 13 cadavers of both sexes (12 men and 1 women) with different age group were used for the study. Head and neck region (26 sides) of the cadavers were carefully dissected as per the standard dissection procedure in the Morphology Laboratory at the University of Pamplona. The described anatomic variation (not found anywhere in literature) were dissected in the left side of a male cadaver of 75 years of age. The topographic details were examined and the variations were recorded and photographed. The history of the individual and the cause of death are not known.

RESULTS

In 25 sides (96.15%) the external jugular vein is formed in the parotid gland mass by the confluence of the posterior auricular vein with

the posterior branch of the retromandibular vein, emerged at the apex of the parotid gland, lying in the carotid triangle and ran a vertical course in the neck. After perforating the investing layer of deep fascia of the posterior triangle, the external jugular vein drained into the subclavian vein. In 25 sides (96.15%) of the cases the findings in relation to the formation, course and tributaries of the facial vein were normal in the face, in the neck it crossed the submandibular gland, received anterior branch of the retromandibular vein and submental vein and continued down terminated into the internal jugular vein via the common facial vein (CFV). The observations of the way in which the lingual, superior thyroid and facial veins drain into the internal jugular, has led to the following results: The internal jugular vein receives as affluent the lingual, facial and superior thyroid veins via a thyrolinguofacial trunk (one side). The lingual, facial and superior thyroid veins drain independent from the internal jugular vein

(one side). The internal jugular vein receives as affluent the lingual and facial veins via a linguofacial venous trunk and independent from the superior thyroid vein (one side). In one side (3.85%), on the left side of a male cadaver of 75 years of age were found absence of external jugular vein with undivided retromandibular vein (RMV), unusually wide in caliber. This undivided RMV united with the facial vein to form a common facial vein which later received posterior auricular vein and terminated by opening into internal jugular vein. Also was observed an arch venous (VA) or common venous channel between internal jugular and the common facial vein (CFV) where the lingual, the infrahyoid and the superior thyroid vein drained. The lingual and the Superior thyroid vein bifurcate and drain through transverse venous connections. The arch venous (VA) was located between the primitive carotid artery and the superior thyroid artery (STA).Figure 1.

Lateral view of neck and angle of the mandible. Left site

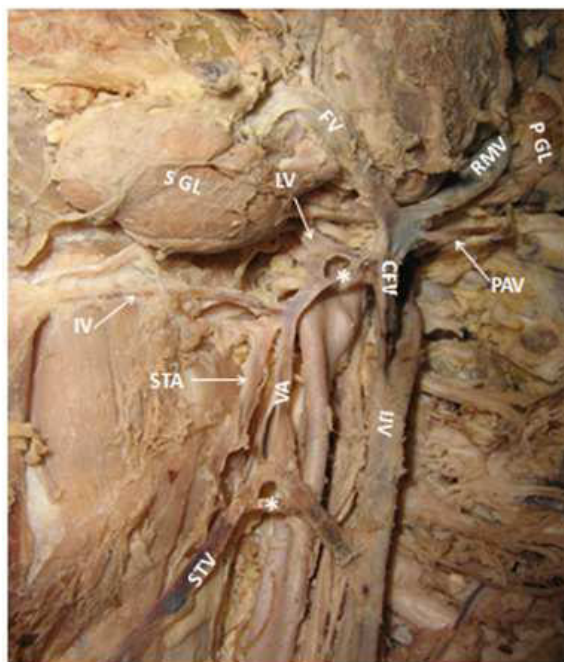


Figure 1

RMV: Retromandibular vein; PAV: Posterior auricular vein; FV: Facial vein; IJV: internal jugular vein; S GL: Submandibular salivary gland; STA: Superior thyroid artery; STV: Superior thyroid vein; IV: Infrahyoid vein; LV: lingual vein; CFV: common facial vein; VA: venous arch; P Gl: parotid gland; Asterisk: transverse venous connections.

DISCUSSION

The veins draining the regions of the face and neck establish their identity only after the development of the skull. The primary vein of the head and the neck arises from the superficial capillary plexus to form the superficial veins first, which subsequently extends towards the cephalad/distal part of the precardinal vein to establish the head and neck venous system. The first vessel that can be identified in the developing neck is the ventral pharyngeal vein. As the neck lengthens (10 mm embryo stage), its drainage level shifts towards the cephalad part of the precardinal vein, which later develops, into internal jugular vein (IJV). At about 22 mm stage of embryo, the external jugular vein (EJV) develops from a venous plexus in the tissue of the neck connecting caudally with the cephalic vein and cranially with the retromandibular vein (RMV) and facial vein (FV)⁵. The RMV and the FV open into the precardinal vein which develops into IJV. The absence of the external jugular vein in this case can be attributed to the failure or regression of the development of the venous plexus connecting the cephalic vein and the anterior facial vein. The retromandibular vein remained undivided and along with facial vein thus drained into the internal jugular vein. A similar finding was also quoted in the literature where there was bilateral absence of the EJV along with undivided retromandibular vein^{8,9}. Generally, external jugular vein is formed by the union of the posterior auricular vein and the posterior division of the retromandibular vein near the angle of the mandible. It then descends obliquely superficial to the sternocleidomastoid muscle and the subclavian triangle where it traverses the deep fascia to end in the subclavian vein. Hollinshead reported that in 1/3 of cases the external jugular vein drains into the internal jugular vein¹⁰. Bergman et al. opined that the formation and the termination of the external jugular vein are variable and the usual pattern is difficult to determine¹¹. They also reported the absence and duplication of the external jugular vein¹¹. Yadav et al. reported termination of the external jugular vein into the internal jugular vein at the level of superior belly of the omohyoid muscle¹². Singh et al. reported an unusual course of the external

jugular vein¹³. Lalwani et al. reported an unusual communication among the external jugular vein of one side, draining into the internal jugular vein of the opposite side, by a venous communication¹⁴. Rajanigandha et al. have found variant left external jugular vein draining into the right subclavian vein¹⁵. The facial vein is the continuation of the angular vein which is joined by the anterior division of the retromandibular vein in the neck to form the common facial vein, which ultimately drains into the internal jugular vein. Facial vein usually drains into the internal jugular vein but variations in its drainage have been reported. The external jugular vein was absent in (3.3%)¹⁶ or in (1%)¹⁷. In the present study one of the cadaver showed unilateral absent external jugular vein and undivided retromandibular vein receiving facial vein to form common facial vein which after receiving posterior auricular vein drains into internal jugular vein in concordance with those reported by Selvi P et al¹⁸. The external jugular vein is a peripheral vein that does neither generally collapse (the patient being in Trendelenburg's position), nor does it become thrombosed. It may represent the extreme solution when the patient requires a peripheral venous access and the other veins are useless. It can also be used for administering non-sclerosing agents. In order to avoid any minor or major complications in dealing with these veins, a safe central venous access is preferred, by sectioning the external jugular, a method that can be used both during medullar transplant and in parenteral nutrition and chemotherapy treatment. Hence the absence of external jugular vein should be borne in mind while attempting all the above surgical procedure^{18,19}. Facial vein acts as draining site of shunt procedure involving lateral ventricle in hydrocephalus surgery. The common facial veins are used as a patch material for carotid endarterectomies^{7,8,18}. A sound knowledge on variation of the course and termination of facial veins is essential for avoiding undue bleeding during radical neck dissection surgeries and also effective usage of these veins for grafting. In normal course of development, external jugular vein has an anterior connection with RMV and posterior connection with posterior auricular vein. The anterior connection later retrogresses and RMV drains into internal jugular vein via

common facial vein^{5,18}. Maskey et al. described the formation of a common venous channel between internal jugular and anterior jugular vein where the facial, the lingual and the submental vein drained²⁰. In the present study was observed a venous arch (VA) or common venous channel between internal jugular vein (IJV) and the common facial vein (CFV) where the lingual, the infrahyoid and the Superior thyroid vein drained. The lingual and the Superior thyroid vein bifurcate and drain through transverse venous connections. The venous arch (VA) was located between the primitive carotid artery and the superior thyroid artery (STA), constitutes a case has not yet reported in the literature. It is thus important to remind medical professionals that awareness of the variations of the veins in the head and neck region is important in order to avoid inadvertent injury during diagnostic and therapeutic utilization of these veins.

CONCLUSION

Absence of external jugular vein and the abnormal pattern of drainage of veins in the head and neck reported here are very rare. Awareness of these venous variations is vital for the surgeons to avoid any intraoperative trial or error during surgical procedures and to prevent unnecessary bleeding. Clinical importance of the internal jugular vein lies in the fact that often inspection, auscultation and Doppler-sonographic examination of the

jugular veins may give a clue to the diagnosis of cardiac diseases. Dilatation of these veins indicates possible compression of the superior vena cava by an underlying pathology of the mediastinum or the pericardium. Jugular veins are important for any ligations that are performed during radical neck dissection surgeries. These veins are often used for catheterization and also as venous manometers and prior anatomical knowledge is needed before such procedures. Facial veins can be used for microvascular anastomosis in reconstruction surgeries of the head and neck. They are also used as patches for carotid endarterectomies and for oral reconstruction. Knowledge of variant drainage of the facial vein is important to avoid inappropriate dissection which may cause severe damage.

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CONFLICT OF INTEREST

Conflict of interest declared none

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