

A Rare Variation of Superficial Venous Drainage Pattern of Neck

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ABSTRACT

Variations in the formation of veins of the head and neck region are common and are well explained based on their embryological background. Complete absence of an important and major vein of the region such as external

jugular vein is very rare and is worth reporting. Knowledge of the variations of external jugular vein is not only important for anatomists but also for surgeons and clinicians as the vein is frequently used for different surgical procedures and for obtaining peripheral venous access as well.

Keywords: Anomalies, External jugular vein, Retromandibular vein

CASE REPORT

During routine dissection for undergraduate students in the Department of Anatomy of North Bengal Medical College, Darjeeling, an unusual venous drainage pattern of the head and neck region was found on the right side in a middle aged female cadaver. The right retromandibular vein (RMV) was formed within the parotid gland by the union of right maxillary and superficial temporal vein. The RMV which was wider than facial vein continued downwards and joined with the facial vein to form the common facial vein (CFV) close to the angle of the mandible [Table/Fig-1]. Its length was measured and was about 8.5 cm. It then continued downwards, superficial to the sternocleidomastoid muscle (SCM) to receive the anterior jugular vein of the right side [Table/Fig-2]. It then reached the supraclavicular triangle and ultimately drained into the right subclavian vein along with the transverse cervical vein draining at the same point [Table/Fig-3]. There was no jugular venous arch in the suprasternal space. Right internal jugular vein was normally draining separately into right subclavian vein [Table/Fig-3]. On dissecting the left side of face and neck region, no abnormal venous drainage pattern was found.

DISCUSSION

Superficial veins of the neck Exhibit a wide array of developmental variations in terms of their formation, course as well as termination; [1] but unilateral or bilateral complete absence of external jugular vein has been a rare entity in the published literature [2,3].

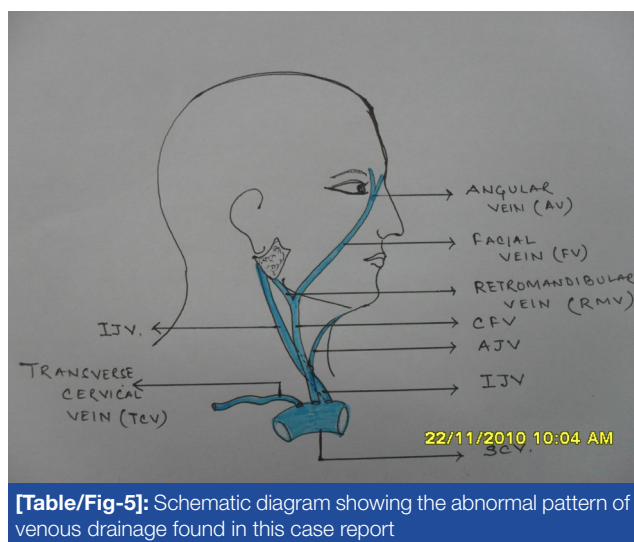
External jugular vein (EJV) is a prominent vein of neck draining the scalp and neck region. It is formed by the union of posterior division of RMV and posterior auricular vein near the angle of the mandible just below or within the parotid gland. Lying superficial to the sternocleidomastoid muscle, it drains into

the subclavian vein after piercing the investing layer of deep cervical fascia [1]. Apart from its formative tributaries, the tributaries of EJV are anterior jugular vein, posterior external jugular vein, transverse cervical vein, suprascapular vein, sometimes occipital vein and communications with internal jugular vein [Table/Fig-4].

During embryonic period, superficial head and neck veins develop from superficial capillary plexuses which will later form primary head veins. Larger veins are formed by the enlargement of individual capillaries, confluence of adjacent ones and regression of some from where the flow has been diverted [5]. The ventral pharyngeal vein (VPV) is the first one identified in face and neck region. VPV develops within the mesenchyme of first branchial arch and joins with the cranial part of primary head vein. Maxillary vein develops within the maxillary process of first branchial arch. The venous plexus around developing clavicle along with the veins of first branchial arch which elongates the terminal part of VPV is shifted toward cephalad part of precardinal vein, which later develops in internal jugular vein (IJV) [6]. Frontonasal process and maxillary process join and within its mesoderm linguofacial vein develops and join with VPV. The primitive maxillary vein anastomoses with linguofacial vein to form anterior facial vein. Retromandibular vein develops within the mesenchyme of temporal region and opens into linguofacial vein to form common facial vein (CFV). CFV ultimately drains into IJV. IJV develops from caudal part of anterior cardinal vein. EJV develops from venous plexus in the neck region connecting caudally with cephalic vein and cranially with RMV and anterior facial vein at 22 mm stage of embryo [7]. The cephalic vein forms a venous ring around clavicle from which it is connected to the caudal part of precardinal vein. The deep segment of this venous ring form subclavian vein. The part of cephalic



[Table/Fig-1]: Photograph showing formation of common facial vein (CFV) by the union of undivided retromandibular vein (RMV) and facial vein (FV) on the right side **[Table/Fig-2]:** Photograph showing anterior jugular vein (AJV) draining into common facial vein (CFV) without forming jugular venous arch **[Table/Fig-3]:** Photograph showing confluence of common facial vein and transverse cervical vein before draining into right subclavian vein. Right internal jugular vein (IJV) was draining separately in the subclavian vein (SV) **[Table/Fig-4]:** Schematic diagram of normal pattern of venous drainage in the head & neck region



[Table/Fig-5]: Schematic diagram showing the abnormal pattern of venous drainage found in this case report

vein which is ventral and superficial to the cephalic (Jugulo cephalic part) often dwindles and is lost [8]. The cephalic vein directly opens into axillary vein below the clavicle and EJV opens into subclavian vein.

The absence of EJV in this case can be attributed to failure or regression of development of venous plexus connecting cephalic vein and anterior facial vein. In our case the Common facial vein replaced the terminal part of EJV and drained into the subclavian vein [Table/Fig-5]. Due to absence of a definite EJV the transverse cervical vein was also seen to drain into the subclavian vein. Bertha A et al., (2011) have reported one case of bilaterally absent EJV and six cases of aberrant course of facial vein out of the 35 specimens in their study. [2] Unilateral absence of EJV has also been reported by Abhinitha P (2013), Balachandra N (2012) and Ghosh S et al., (2012) in three different studies [3,9,10]. Variation in formation and course of EJV has also been reported in a few studies [9,10,11].

EJV is an important and easily accessible superficial vein of the neck which is frequently used for measuring central

venous pressure and for cannulation for various diagnostic and therapeutic purposes [12]. EJV is also used for transjugular biopsy, grafting and several other oral reconstructive surgeries [13,14].

To conclude, developmental absence of external jugular vein and jugular venous arch is extremely uncommon in the literature and has got immense clinical importance for surgeons as external jugular vein is commonly used for various clinical and diagnostic procedures as well as in reconstructive surgery in the face and neck region.

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