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Case Report

# Absent external jugular vein – ontogeny and clinical implications*

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## Abstract

Variation in the formation, course and termination of vessels especially veins is more a norm in anatomy than a rarity. It is only to be expected because the development of an artery or a vein is based on the persistence of one vascular pathway and the disappearance of the rest in a mesh of plexiform channels. Yet, total absence of an important vein merits reporting; more so, if that vein is used for peripheral venous access by clinicians. We came across absence of right external jugular vein during routine dissection of an adult male cadaver. The knowledge of absence of external jugular vein is also important with reference to reconstructive surgeries of head and neck. The details of this variation and its embryological basis are discussed here.



**Key words** [external jugular vein] [variation]

## Introduction

The external jugular vein (EJV) is one of the superficial veins of the neck (the other being the anterior jugular vein). The EJV drains blood from the exterior of the cranium and the deep part of the face. It begins just below the angle of the mandible or within the parotid gland by the union of the posterior division of the retromandibular vein (RMV) and posterior auricular vein (PAV). The EJV runs obliquely downwards and backwards under the cover of platysma and across the sternocleidomastoid muscle. It then pierces the investing layer of the deep cervical fascia just above the midpoint of the clavicle, appears in the supraclavicular triangle and terminates in the subclavian vein. In addition to formative tributaries, the external jugular receives the posterior external jugular and, near its end, transverse cervical, suprascapular and anterior jugular veins. In the parotid gland a branch from the internal jugular vein often joins it. The occipital vein occasionally joins it [1].

## Case Report

During routine cadaveric dissection for the undergraduate students, we noticed that in an adult male cadaver, the right external jugular vein was absent in the neck. The right retromandibular vein remained undivided and was seen to drain into the internal jugular vein. The cephalic vein of the same side was seen to drain into the right subclavian vein after crossing superficially over the clavicle. The left external jugular vein was as usual in its formation and drainage (Figures 1, 2, and 3).

## Discussion

### *Ontogeny*

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) [2]. At about 22 mm stage of embryo, the EJV develops from a venous plexus in the tissue of the neck connecting caudally with the cephalic vein and cranially with the RMV and anterior facial vein (AFV) [3]. The RMV and the AFV open into the precardinal vein which develops into IJV. The part of the cephalic vein which is ventral and superficial to the clavicle (jugulocephalic part)

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**Figure 1.** Anterior view of the neck showing left external jugular vein (held with the forceps) under the cover of platysma and the right side showing absence of the same.

often dwindles and is usually lost [4]. Hence, the cephalic vein independently opens into the axillary vein below the clavicle and EJV opens into the subclavian vein above the clavicle (Figure 4).

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 [5]. The ventral part of the cephalic vein (jugulocephalic segment) persisted in this case and was seen traversing the clavicle superficially and draining into the subclavian vein. The persistence of a similar communicating vein is also mentioned in the literature [6].

The literature mentions a lot about the variations in the formation, communications and drainage of the EJV [7]. Even though, such variations are common, the combination of undivided retromandibular vein, absent external jugular vein and persistence of the jugulocephalic segment seen in the present case is unique and thus reported.

*Clinical Significance*

The EJV is utilized for cannulation to conduct diagnostic procedures or intravenous therapies especially in children. It is also increasingly being used by the clinicians for therapeutic procedures and monitoring central venous pressure. Knowledge of variations pertaining to EJV is also important for surgeons using this vein as patch for carotid endarterectomy and for oral reconstruction surgeries.

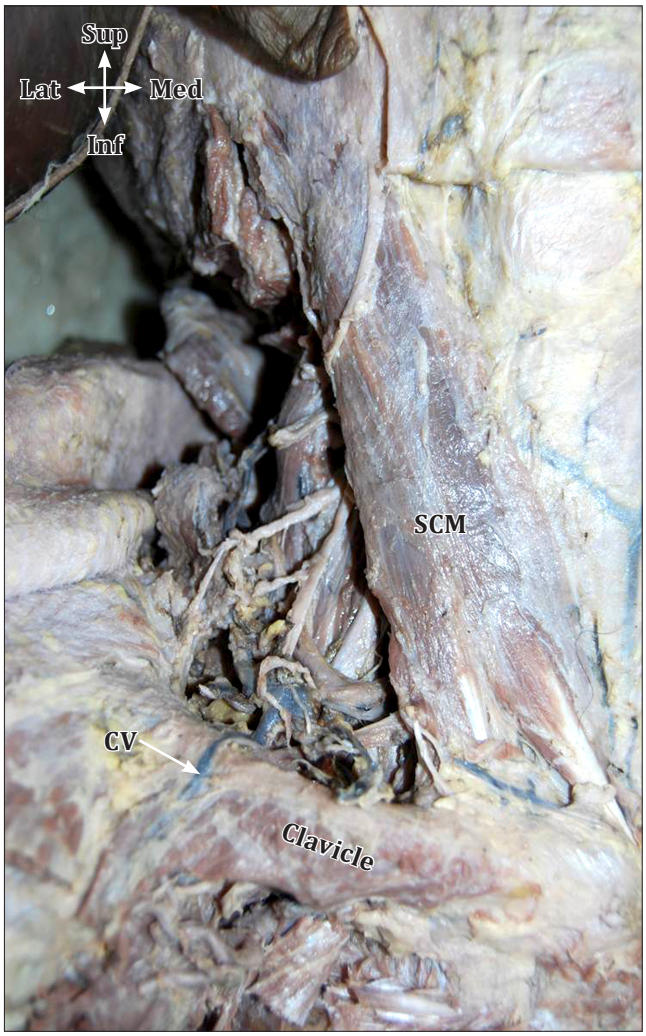


**Figure 2.** Anterior view of the right side of the neck showing absent external jugular vein and *cephalic vein* ***(CV)*** draining into the subclavian vein after crossing over the clavicle. ***(SCM****: sternocleidomastoid muscle)*

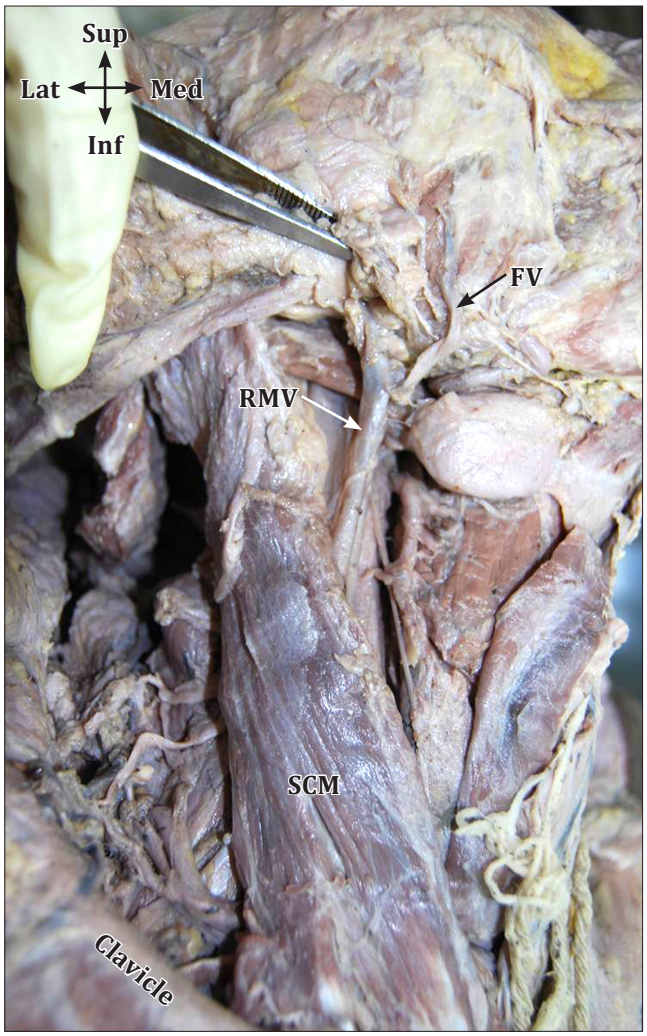


**Figure 3.** Anterior view of the right side of the neck showing undivided *retromandibular vein (**RMV**)* joining with the *facial vein (**FV**)* and draining into the internal jugular vein. *(**SCM**: stenocleidomastoid muscle)*

## Conclusion

The variations in the venous system is often considered as unimportant but in the head and neck region, the knowledge of these superficial veins is mandatory for the clinicians and surgeons.

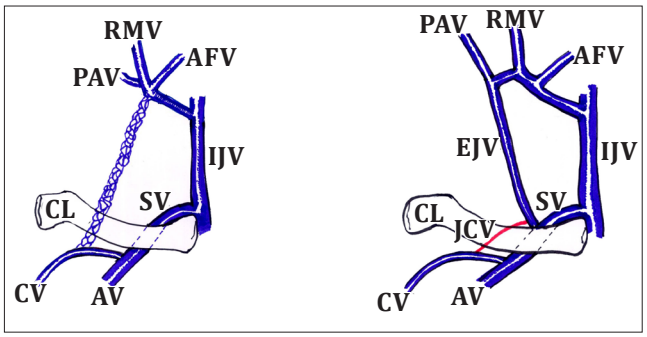


**Figure 4.** Schematic diagram showing developmental stages of the external jugular vein of the right side. *(**RMV**: retromandibular vein; **AFV**: anterior facial vein; **PAV**: posterior auricular vein; **IJV**: internal jugular vein; **EJV**: external jugular vein; **CV**: cephalic vein; **AV**: axillary vein; **SV**: subclavian vein; **JCV**: jugulo-cephalic vein: **CL**: clavicle)*

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