

Anatomical Variations In Termination Of Common Facial Vein

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ABSTRACT

Introduction: Variations in the venous drainage pattern of the face and neck are quite common. The objective of this study was to observe the variations in the formation and the drainage of the common facial vein. **Methods:** The variations of the superficial veins of the neck were noted in thirty five specimens (17 belonging to the left side and 18 to the right) of the South Indian population which were used for routine dissection, for teaching the medical graduates in Christian Medical College, Vellore. **Results:** This is a report on the unusual drainage of the common facial veins into the subclavian and the absent

external jugular veins bilaterally. Another interesting variant is the undivided retromandibular vein continuing as the external jugular vein and the anterior facial vein opening into the internal jugular vein. In three cases, the common facial veins were found to open into the external jugular vein at varying distances from the base of the mandible. The embryological basis for the variations is discussed here. **Conclusion:** The knowledge of the varying venous patterns in the neck is important for clinical practitioners who perform procedures like cannulation and venegraft harvesting in endarterectomy.

Key Words: Superficial veins of the neck, Common facial vein, External jugular vein, Subclavian vein, Anomalies

Key messages:

Variations in the formation and termination of the common facial veins are common. A thorough understanding and knowledge of the variations are essential in order to avoid complications during clinical procedures.

INTRODUCTION

The veins of the head and neck have a complex developmental pattern which predisposes them to variations in formation and drainage. Usually, the anterior facial vein begins at the medial angle of the eye as the angular vein, by the union of the supra-trochlear and the supra-orbital veins. The superficial temporal vein unites with the maxillary vein to form the retromandibular vein. The retromandibular vein divides into the anterior and the posterior divisions within the substance of the parotid gland. The anterior division joins with the anterior facial vein to form the common facial vein and it drains into the internal jugular vein. The posterior division, after union with the posterior auricular vein, continues as the external jugular vein which drains into the subclavian vein [1].

The superficial veins of the neck are often used for cannulation, either for intravenous infusion or for central venous pressure monitoring. Furthermore, these venous segments are used as a patch for carotid endarterectomies. Hence, a thorough knowledge of the normal anatomy and their variations could be useful in performing these procedures.

Variations in the drainage pattern of the veins of the neck and face have been reported earlier [2]. The present study was aimed to look at the formation and the drainage of the common facial vein in specimens of the South Indian population. We are reporting here, the rare occurrence of the common facial vein draining into the subclavian vein bilaterally, in addition to other anomalies.

MATERIALS AND METHODS

A total of thirty five specimens of both sexes, seventeen of the left side and eighteen of the right side, were dissected to look for the variations in the formation and the termination of the common

facial vein on the cadavers that were donated to the department of Anatomy of our institution for the purpose of teaching and research. Of the 35, 14 specimens were from seven individuals, and the rest were isolated prosected specimens.

OBSERVATIONS

Of the thirty five specimens that were studied, 29 of the common facial veins were found to conform to the normal pattern of formation and drainage. Six specimens showed variations in their terminations.

The rare bilateral drainage of the common facial vein into the subclavian vein and the bilateral absence of the external jugular vein.

In one cadaver, there was no division of the retromandibular veins into the anterior and posterior veins on both sides. The common trunk of the retromandibular veins joined with the anterior facial veins to form the common facial veins. The external jugular veins were absent bilaterally. On the right side, the common facial vein passed deep to both the sternocleidomastoid muscle and the superior belly of the omohyoid, reached the anteroinferior angle of the posterior triangle of the neck and drained into the right subclavian vein [Table/Fig 1]. On the left side, the common facial vein passed under the cover of the anterior border of the sternocleidomastoid, but superficial to the omohyoid muscle. When it reached the medial end of the clavicle, it ran towards left, to open into the left subclavian vein, at its union with the internal jugular vein. The terminal parts of both the common facial veins were found to be abnormally dilated [Table/Fig 2].

The variant formation of the common facial vein

In another specimen, the undivided retromandibular vein continued as the external jugular vein on the right side. The anterior facial



[Table/Fig 1]: Uncommon drainage of left common facial vein into left subclavian vein, coursing superficial to the superior belly of omohyoid. CFV – common facial vein, RMV – retromandibular vein, IJV – internal jugular vein, SCV – subclavian vein, OH – omohyoid. Arrow indicates the dilated distal part of CFV.



[Table/Fig 2]: Uncommon drainage of right common facial vein into right subclavian vein, passing deep to superior belly of omohyoid. AFV – anterior facial vein, CFV – common facial vein, RMV – retromandibular vein, SCM – sternocleidomastoid, OH – omohyoid. Arrow indicates the dilated distal part of CFV.



[Table/Fig 3]: Undivided retromandibular vein forming external jugular vein and drainage of common facial vein into internal jugular vein. CFV – common facial vein, RMV – retromandibular vein, IJV – internal jugular vein, EJV – external jugular vein, SCM – sternocleidomastoid, OH – omohyoid.

vein, after receiving the submental vein, formed the common facial vein and drained into the internal jugular vein [Table/Fig 3].

Variations in the termination of the common facial vein into the external jugular vein

In three specimens, the common facial vein opened into the external jugular vein. In one prosected specimen, on the right side, the common facial vein ran separately for almost the whole length of the neck and opened into the external jugular vein, approximately 3 cms superior to the clavicle [Table/Fig 4]. In two other cadavers, the left common facial vein drained into the external jugular vein, while the right vein drained into the internal jugular vein.

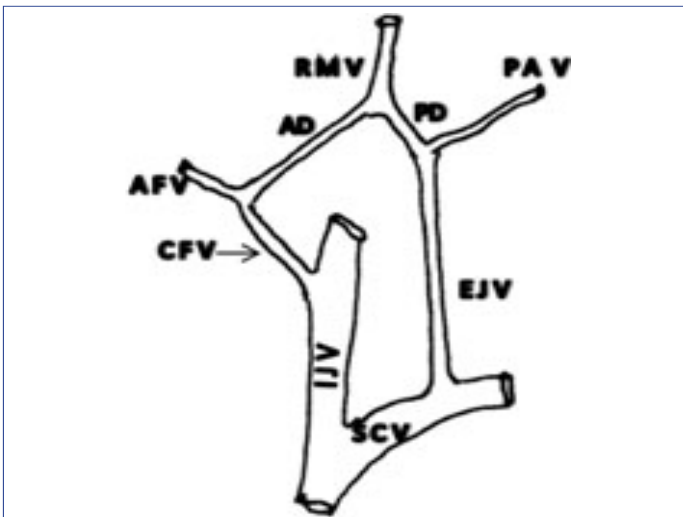
DISCUSSION

The first identifiable vein of the face and neck is the ventral pharyngeal vein (VPV). It drains the mandibular and the hyoid arches and opens into the common cardinal vein. As the neck elongates (10 mm embryo stage), the termination of VPV is transferred to the cranial part of the precardinal vein which later becomes the internal jugular vein. The ventral pharyngeal vein receives the linguofacial vein, which drains the face and tongue. The primitive maxillary vein which drains the territory of the ophthalmic and the mandibular divisions of the trigeminal nerve anastomoses with the linguofacial vein to form the anterior facial vein. The retromandibular vein draining the temporal region, opens into the linguofacial vein to form a common trunk known as the common facial vein, which ultimately drains into the internal jugular vein. In the upper limb, the preaxial vein becomes the cephalic vein. The external jugular vein develops as a tributary of the cephalic vein from the tissues of the neck and anastomoses secondarily with the anterior facial vein. The cephalic vein forms a venous ring around the clavicle, from which it is connected to the



[Table/Fig 4]: Drainage of common facial vein into external jugular vein. CFV – common facial vein, EJV- external jugular vein, CL – clavicle.

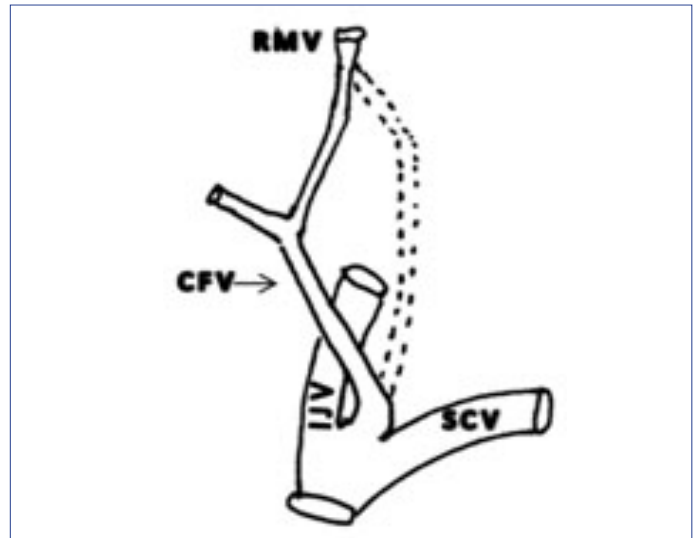
caudal part of the precardinal vein. The deep segment of this venous ring forms the subclavian vein and receives the definitive external jugular vein [1]. In the normal course of development, the external jugular vein has an anterior connection with the facial vein and a posterior connection with the retromandibular vein [Table/Fig 5].



[Table/Fig 5]: Schematic representation of the embryological basis of the variations of common facial vein. Normal formation and termination of CFV represented on left side.

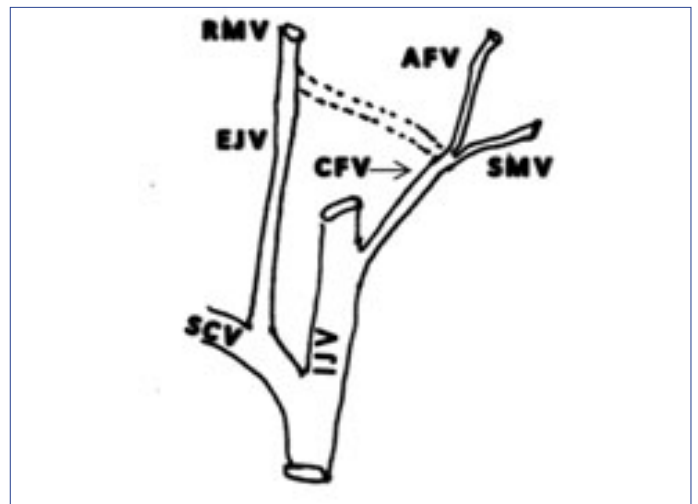
The anomalous patterns could be explained by the regression and / or retention of the venous anastomotic channels. In the first case, the cranial part of the external jugular vein fails to develop. The common facial vein, instead of draining into the precardinal vein, anastomoses with the caudal part of the external jugular vein. This explains the reason as to why the common facial vein drains into the subclavian vein [Table/Fig 6].

A unilateral termination of the common facial vein into the subclavian vein on the left side has been reported earlier [3]. The variation in



[Table/Fig 6]: Schematic representation of the embryological basis of the variations of common facial vein. Dotted lines represent absent proximal part of EJV, drainage of CFV into the junction between IJV and SCV on the left.

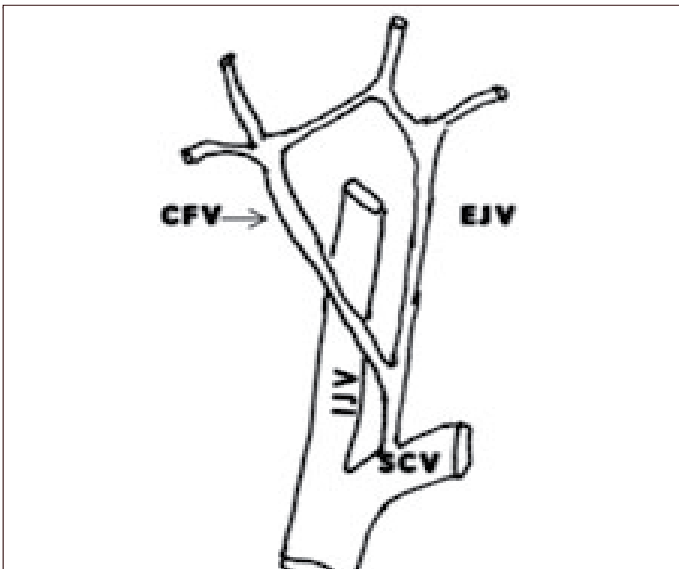
the formation of the common facial vein in the second case is due to the absent communication between the retromandibular vein and the linguofacial vein [Table/Fig 7].



[Table/Fig 7]: Schematic representation of the embryological basis of the variations of common facial vein. Variant formation of CFV and undivided RMV on the right.

The drainage of the common facial vein into the external jugular vein could be explained by the persistent anastomotic channel between the primitive linguofacial vein and the secondarily developing external jugular vein [Table/Fig 8] [4].

The facial vein drains into the external jugular vein with varying degrees of obliquity in a Y- shaped, U- shaped, tuning-fork shaped, N-shaped, inverted A-shaped or a stepladder-shaped pattern [2]. Variations in the patterns of termination of the facial vein into the external jugular vein with a higher preponderance on the right side have been reported [5]. In the present study, the opening of the common facial vein into the external jugular vein at a higher level on the left side, approximately 4 cms below the base of mandible, was observed in two cases, with a third opening on the right side and at a much lower level [Table/Fig 4].



[Table/Fig 8]: Schematic representation of the embryological basis of the variations of common facial vein. CFV draining into EJV on the left. CFV – common facial vein, EJV- external jugular vein, IJV – internal jugular vein, RMV – retromandibular vein, SCV – subclavian vein, AFV – anterior facial vein, SMV- submental vein, PAV – posterior auricular vein. AD – anterior division of RMV, PD – posterior division of RMV

The superficial veins, especially the external jugular are often utilized for cannulation to conduct diagnostic procedures or intravenous therapies. The ease of access of the external jugular vein has facilitated its use in patients undergoing transjugular liver biopsy and portosystemic shunts. It has also been used to monitor central venous pressure [6]. The absence of the external jugular vein should be borne in mind while attempting surgical procedures.

The common facial vein has been used as a patch material for carotid angioplasty, as it is almost always available at the carotid exposure site. It can be harvested by the same incision by a simple technique and at no extra operating time [7], [8]. The common

facial vein has also been used in ventriculojugular shunts for the management of hydrocephalus [9] and for placing the central venous catheter for hyperalimentation and venous pressure monitoring [10]. Variations of the common facial vein, which have been noted in this study, could be of assistance to vascular surgeons and also to radiologists.

The knowledge of the variations of the superficial veins of the neck is essential for avoiding undue bleeding during neck surgeries and also the effective utilization of these veins for grafting in endarterectomies.

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