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ANATOMIC VARIATIONS

Unusual course and termination of common facial vein: a case report

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Abstract
Given the common and increasing exploitation of superficial head and neck veins in a widening spectrum of clinical and surgical procedures, it is important to equally broaden understanding of the heterogeneity of the vascular anatomy of the region. We report an unusual course of the right common facial vein parallel to the course of external jugular vein, emptying into the ipsilateral subclavian vein in the lateral neck triangle behind the posterior border of the sternocleidomastoid muscle in a 78-year-old male cadaver. Such course may be hazardous for surgical procedures in the region given the high risk of profuse haemorrhage from any injury of the vessel. The variant anatomy may also cause problems in invasive techniques involving the vein, especially in emergency and intensive care settings. This index report, therefore, provides a new insight into the superficial head and neck vein anatomical variations in order to guide relevant clinical procedures in the region.

Keywords Common facial vein · Anatomical variation · External jugular vein · Lateral neck triangle

Introduction

Considerable variation exists in the anatomy of the head and neck veins, reflecting the rather complex vascular embryology of the region. The common facial vein (CFV), which usually drains into the internal jugular vein, is most often formed by the union of the anterior facial vein and the anterior division of the retromandibular vein. The posterior division of the retromandibular vein unites with the posterior auricular vein and continues as the external jugular vein caudally, draining into the subclavian vein [5]. Superficial veins of the head and neck can be used for central venous pressure monitoring and intravenous infusion during surgeries. Moreover, they can be used as a patch for carotid endarterectomies and other procedures [1], demonstrating the clinical importance of their anatomical heterogeneity. Several variations of the CFV in respect of morphology, relative size and termination have already been described [5]. We report on an unusual, not yet described, anatomic variation observed during a cadaver dissection—a CFV coursing medial to the external jugular vein and draining directly into the subclavian vein.

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Case report

While dissecting a 78-year-old male embalmed cadaver during a course of applied clinical anatomy for dental students, an unusual course of the right CFV was noted (Fig. 1). It originated from the facial vein and the long anterior division of the retromandibular vein, inferior to the angle of the mandible at the level of hyoid bone, between the posterior border of the submandibular salivary gland and the anterior border of the sternocleidomastoid muscle. The anterior division of retromandibular vein also received the transverse facial vein. CFV coursed caudally across the sternocleidomastoid muscle where it assumed a direction parallel to the external jugular vein, being formed by the short posterior division of the retromandibular vein and the posterior auricular vein. It terminated into the right subclavian vein in the lateral neck triangle, just behind the posterior border of the sternocleidomastoid muscle and medial to the termination of the right external jugular vein. We noted no interconnections between the CFV and the external jugular vein. The length of the right CFV was 7.5 cm from the level of its formation to the level of termination and its relative size was comparable to the size of the external jugular vein (3.0–3.5 mm). On the left side, the formation of the veins was as per the classical pattern. The facial vein and the anterior branch of the retromandibular vein united to form CFV, emptying into

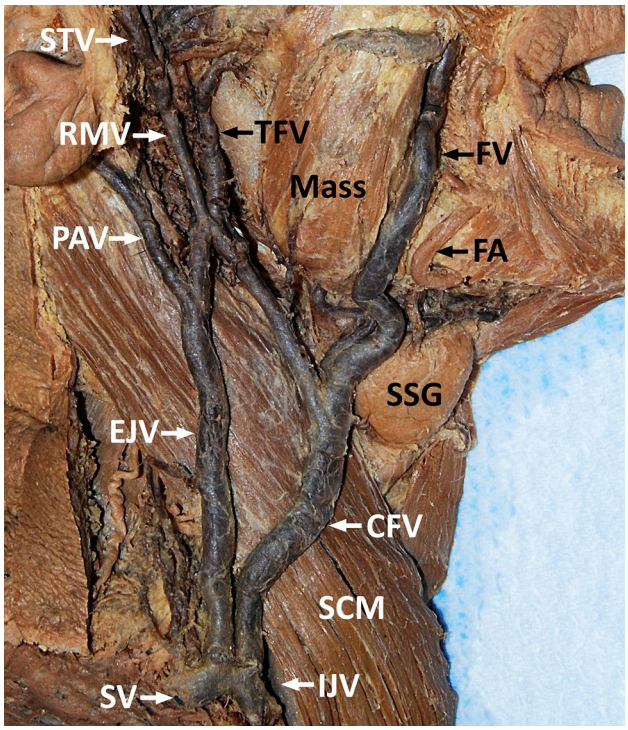

Fig. 1 The unusual termination of the common facial vein into the subclavian vein. *STV* superficial temporal vein, *TFV* transverse facial vein, *Mass* masseter muscle, *FV* facial vein, *RMV* retromandibular vein, *FA* facial vein, *PAV* posterior auricular vein, *EJV* external jugular vein, *SSG* submandibular salivary gland, *CFV* common facial vein, *SCM* sternocleidomastoid muscle, *SV* subclavian vein, *IJV* internal jugular vein

the internal jugular vein. No other vascular variations were observed.

Discussion

The present case reports an unusual anatomic variation of the right CFV running medial to the external jugular vein across the sternocleidomastoid muscle and draining directly into the subclavian vein, observed during a cadaver dissection. Such a case has hitherto not been reported in the literature. Most superficial veins exhibit notorious diversity in course, relative size and termination. The same is true for head and neck veins, most notably the external jugular and anterior jugular veins. Anatomical variations of facial vein and CFV are also not unusual. Normally, the common facial vein is formed by the fusion of the anterior division of retromandibular vein and the facial vein and drains into the internal jugular vein. However, the termination of the facial vein and CFV is remarkably inconstant. Choudhry et al. [3] and Gupta et al. [5] respectively, reported that 5% and 9% of facial veins drain into the external jugular vein, with the aberrant anatomy showing higher predilection for the right side [7]. According to Gupta et al. [5] the various courses of facial vein and external jugular veins may be classified into two types on the basis of the absence of any interconnection between the two veins (type I) or the presence of at least one interconnection between them (type II). They further classified each type into several subtypes. Vollala et al. [10] reported an anatomical discrepancy where the CFV continued as external jugular vein and drained into the subclavian vein. Similarly, a large CFV draining into the subclavian vein and absent external jugular vein was reported by Prakash et al. [8]. In the presented case, the right CFV coursed medial to and parallel with the external jugular vein, draining directly into the right subclavian vein. Cranially, this course resembles the tuning-fork-shaped pattern where the facial vein and the external jugular vein of similar diameter lie almost parallel. However, caudally, the CFV in our case empties directly into the subclavian vein, while in the tuning-fork-shaped pattern the facial vein and the external jugular vein form a large venous trunk behind the posterior border of sternocleidomastoid muscle [5, 9].

During embryogenesis the CFV is derived from the union of the retromandibular and linguofacial veins, forming a common trunk, known as the common facial vein that empties into the internal jugular vein which is derived from the cardinal vein. The external jugular vein is derived as a tributary to the cephalic vein which forms a venous vascular ring surrounding the clavicle. Later during development, the vascular ring partially regresses. The deep segment of this ring forms the subclavian vein and receives the external jugular vein [3]. Failure of regressions and possible retentions of the venous anastomotic channels during development could explain the variability of common facial vein course. Choudhry et al. proposed that the drainage of CFV into the external jugular vein develops due to a persistent anastomotic channel between the primitive linguofacial vein and the secondarily developed external jugular vein [3]. Furthermore, Bertha et al. proposed that the drainage of CFV into the subclavian vein develops on account of failure of development of the cranial part of external jugular vein and simultaneous anastomosis of the CFV with the formed caudal part of external jugular vein [1]. In our case, we noted no vascular trunk or other anastomoses between the external jugular vein and the CFV. Therefore, we think that this CFV could have developed from a persistent anastomosis between the embryologic linguofacial vein and the deep portion of the venous vascular ring.

The superficial head and neck veins are important in a broad range of clinical circumstances including emergency, intensive care and surgical setting. The external jugular vein or other large superficial neck veins are very commonly used to clinically assess the central venous pressure. The external jugular vein is also used to achieve central venous access for invasive central venous pressure monitoring, urgent

dialysis, parenteral nutrition and administration of medications, especially during emergencies [1, 3]. Recently, it has also been exploited for transjugular liver biopsies and portosystemic shunt placements, for carotid angioplasty and for ventriculojugular shunt for treatment of hydrocephalus [1]. Furthermore, the variant course of the CFV may traverse through the operating field for lateral neck dissection, carotid endarterectomy and may be very proximally related to the incision for thyroidectomy [4, 6]; hence, surgeons must take special care not to accidentally injure the vein. The anatomy of the facial vein and CFV are also critically important in facial transplantation surgery as they are frequently used in flap connection [2]. Accordingly, a broader knowledge of the potential anatomical variations in the superficial head and neck veins is imperative to guide their precise correlation and their utility in clinical settings.

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Compliance with ethical standards

Conflict of interest The authors confirm that this article content has no conflicts of interest.

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