

# Variant course of the submental vein

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*Superficial head and neck vessels are increasingly used in surgical procedures and are especially important in facial transplantation surgeries. We report a variant course of the submental vein observed during a dissection of a 79-year-old-male embalmed cadaver: a left submental vein running caudally across the intermediate tendon of the digastric muscle, separating from the course of the submental artery and emptying directly into the common facial vein in the carotid triangle. Such course may complicate submental island flap harvesting, as well as the graft manipulations and reattachment, since the vein could be damaged during the conventional procedure. This report therefore extends current knowledge of the variations of the vascular anatomy of the head and neck. (Folia Morphol 2020; 79, 1: 176–178)*

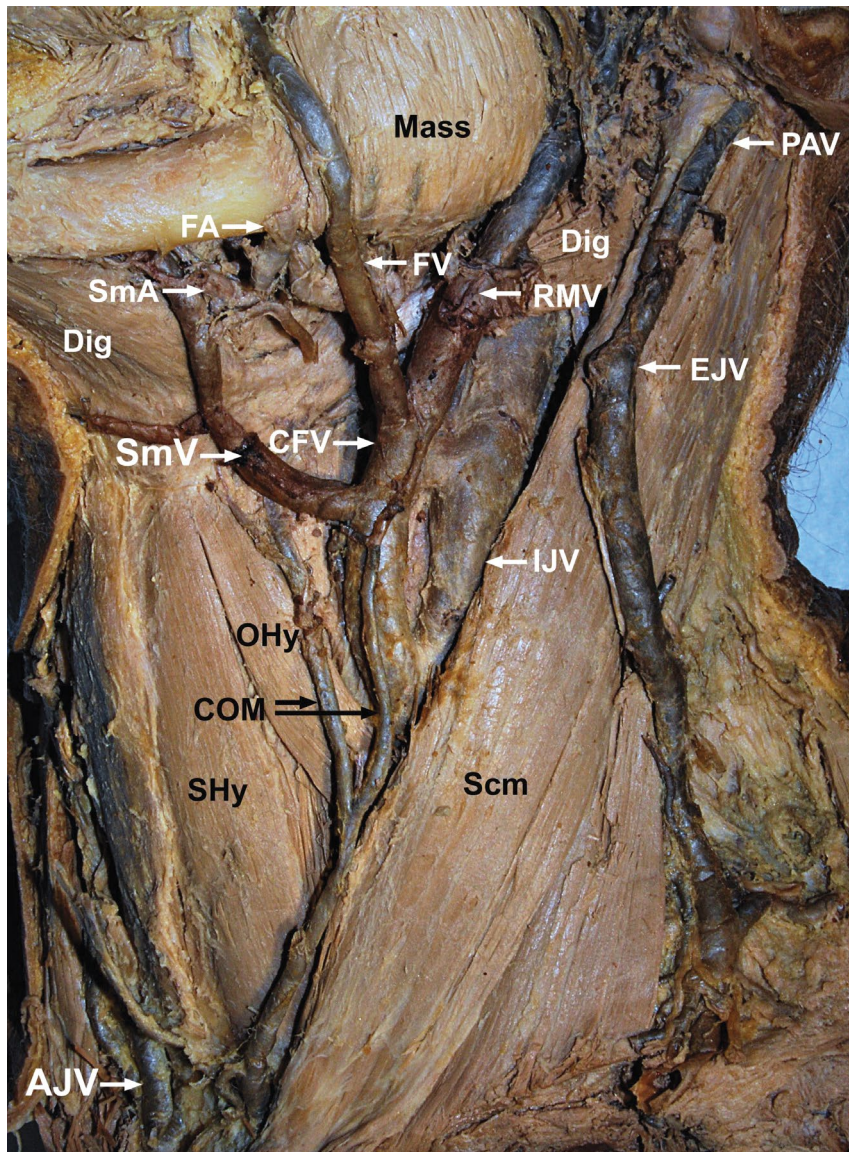
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## INTRODUCTION

The embryologic development of the head and neck veins is rather complex, and accordingly, a considerable variation in their anatomy may be expected. The submental vein usually arises from the venous network in the submental triangle. It runs superficial to the anterior belly of the digastric muscle, courses laterally across the submandibular salivary gland, and drains into the facial vein, near the angle of the mandible [6]. Recently, it was demonstrated that the vascular anatomy (and its potential variations), especially the drainage pattern of submental vein, is a determining factor of a successful submental island flap raising and survival [5]. Furthermore, submental vessels are also suitable for anastomoses for free gracilis muscle flaps for smile reanimation surgeries in vessel-depleted hemiface [4]. We report a variant, not yet described, vascular anatomic variation observed during a cadaver dissection — a submental vein coursing caudally across the intermediate tendon of the digastric muscle and draining directly into the common facial vein in the carotid triangle.

## CASE REPORT

During the neck dissection of a 79-year-old male formalin-embalmed cadaver, as part of training for maxillofacial surgeons, an unusual course of the left submental vein was observed (Fig. 1). It originated normally from the network of small veins in the submental triangle. From there, it coursed laterally to the submandibular triangle, running along the lateral border of the anterior belly of the left digastric muscle. Just after the passing the intermediate tendon of the digastric muscle superficially, it turned laterally and entered the carotid triangle, terminating into the left common facial vein, 1 cm below the level of the hyoid bone and 2 cm apart from the origin of submental artery. The courses of the left facial and left submental vein were nearly parallel. The length of the left submental vein from the level of its formation to the level of termination was 7.0 cm and its relative size was comparable to the size of the left facial vein (3.5–4.2 mm). We also noticed a small communication vein joining the retromandibular vein and the ipsilateral subclavi-



**Figure 1.** The variant course of the submental vein; Mass — masseter muscle; FV — facial vein; FA — facial artery; Dig — digastric muscle; SmV — submental vein; SmA — submental artery; OHy — omohyoid muscle; PAV — posterior auricular vein; RMV — retromandibular vein; CFV — common facial vein; IJV — internal jugular vein; EJV — external jugular vein; AJV — anterior jugular vein; Scm — sternocleidomastoid muscle; COM — communication veins; SHy — sternohyoid muscle.

an vein. The left retromandibular vein had no divisions and directly formed the common facial vein after receiving the left facial vein. The common facial vein drained into the internal jugular vein and the left posterior auricular vein continued as the external jugular vein, emptying into the left subclavian vein. Meanwhile, the submental artery had a normal course. It branched off from the facial artery in the submandibular gland, running forward upon the mylohyoid muscle just below the body of the mandible. On the right side of the face, the formation and course of the veins were as per the classical pattern; the right submental vein coursed laterally and drained into the

facial vein in the submandibular triangle. No other vascular variations were observed.

## DISCUSSION AND CONCLUSIONS

The present report describes a rare variant course of the left submental vein running caudally across the intermediate tendon of the digastric muscle and emptying directly into the common facial vein. Such a case has not yet been reported in the literature. In fact, apart from the case reported by Vollala et al. [11], where the submental vein joined the facial vein at the same point as the retromandibular vein in the submandibular triangle, to the best of our knowledge,

no other anatomical variations of the submental vein have been documented.

The embryologic basis of the anatomic variations of the veins of the face and neck has not yet been clearly understood. The original cephalic vein formed early in the embryonic life subsequently regresses, and becomes replaced by venous spaces and channels that form the precursors of the facial and pharyngeal veins. The first identifiable vein in the face and neck is the ventral pharyngeal vein (VPV) that drains the first and second pharyngeal arches. As the neck elongates, the termination of VPV moves from the common cardinal vein to the precardinal vein which is a predecessor of the internal jugular vein. The VPV receives the linguofacial vein which drains the face and tongue, and is also a termination point of the submental vein [3]. The observed anatomical variation of the submental vein could be the consequence of persistent anastomotic channels between primitive veins during development.

In 1993, Martin et al. [7] described the original surgical technique and the use of an axial pattern flap based on the anatomical disposition of the submental artery and vein. This technique was later modified to include mylohyoid muscle and removal of the submandibular gland which enables better visualisation of vascular pedicle [8]. Submental island flap is considered a reliable source of skin with good colour, texture and contour match for covering of facial defects, in addition to being technically safe, rapid and simple to raise, leaving a well-hidden donor site [10]. The submental vein is one of the key vessels of the axial submental island flap, needed for a sufficient venous drainage. Together with the submental artery, they constitute the vascular pedicle which nourishes the tissue of the flap [7].

The submental island flap can be used both as a pedicled regional flap or a free distant flap. In the case of pedicled regional flap, the variant anatomy of the submental vein could be a major limitation regarding the length of the pedicle, preventing sufficient flap rotation and mobility to the sites of the defect [9]. Furthermore, the pedicle of the flap (the submental artery and vein) bear surgically delicate proximity with many important structures, and when used as a free distant flap, the unusual vein course may make the vein and closely related structures more susceptible to injury by surgeons following the conventional procedure for flap harvesting. Such injured veins could be more susceptible to thrombosis and consequent disrupted venous drainage and graft

congestion and necrosis [1]. In addition, in contrast to the usual anatomy where the submental vein courses parallel and just inferior to the submental artery, the vein and artery in this case were not proximally related and may make the flap connection to the new nurturing vessels impossible [2]. Accordingly, in the light of all the above considerations, it is clear that a broader knowledge of the potential heterogeneity of the relevant vascular anatomy is imperative to make reconstruction surgeries using submental island and free gracilis flaps safe and successful.

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