Unusual site of formation of brachiocephalic vein along with multiple venous anomalies in neck and its clinical importance

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Abstract

Neck veins are important for various diagnostic, therapeutic and experimental procedures. So knowledge of their anatomical variation is also important. The author reports an unusual site of formation of brachiocephalic vein with multiple venous anomalies in the neck. A rare site of formation of the right brachiocephalic vein was found at the middle of neck under the right sternocleidomastoid muscle by union of right internal jugular and subclavian vein. Another observation was of facial, lingual and superior thyroid veins joined together and formed a common vein over the sternocleidomastoid muscle that drained into the external jugular vein. This unusual course of brachiocephalic vein and aberrant drainage of facial, lingual and superior thyroid veins may cause unusual bleeding during surgeries and invasive procedures. So clinicians should be aware of these variations of major neck veins to avoid complications.

Key words: retromandibular vein, central venous cannulation, external jugular vein, facial vein

Introduction

Neck contains major great vessels which supply blood to the brain, viscera of head and neck and upper limbs. They have been used for various experimental, diagnostic and therapeutic procedures. They are vulnerable to external sharp or blunt injury and causes severe bleeding or haematoma formation. Surgical interventions for diagnostic or therapeutic measures also can lead to unavoidable bleeding complications. So neck vessels and their variations are quite important to cardiothoracic surgeon, neurosurgeon, cardiologist and general surgeon. The variation is rather common in venous system than arterial. The major veins of the neck are internal jugular, external jugular, anterior jugular, subclavian and their main tributaries. Usually the brachiocephalic veins are formed by the union of subclavian and internal jugular veins at the root of neck behind the sternal head of clavicle. It is very unusual to find in neck. In the present case report, the author reports an unusual site of formation of right brachiocephalic vein associated with other venous anomalies and their clinical importance. So during cardiac catheterization, central line placement, tracheotomy and neck surgery clinicians and surgeons should be aware of these types of variations in neck veins to prevent intraoperative and post operative unusual uncontrolled bleeding.

Case report

During routine cadaveric study of head and neck region in a 64 years old male cadaver, the author observed some venous anomalies in the right side of the neck. After reflection of skin, superficial fascia and deep fascia from the anterior and posterior triangles of neck we noticed multiple venous channels were running over the superficial aspect of upper part of right sternocleidomastoid (SCM) muscle. After tracing the veins individually it was found that retromandibular vein (RMV) joined with posterior auricular vein (PAV) and formed a common channel. Facial vein (FV) joined with lingual vein (LV) formed a common vein and the superior thyroid vein (STV) also joined with that vein (Figure 1). This common vein joined with another common vein which was formed by joining of retromandibular and posterior auricular veins on superficial aspect of upper third of right sternocleidomastoid muscle. This is actually external...
case the external jugular vein was formed by the retro
mandibular vein and a common trunk whose tributaries
were facial, lingual and superior thyroid veins (Figure I & 2). When subclavian vein was traced proximally, it
was observed that a large sized vein was present under
surface of sternocleidomastoid muscle (Figure 1).
Indicated with black arrow head) and joining with
subclavian vein. Internal thoracic vein was draining at
the point of fusion of these two veins on inferior aspect.
After retraction of sternocleidomastoid muscle laterally
that large size vein was placed lateral to common carotid
artery (CCA) within the carotid sheath. During dissection
of thorax it was confirmed that the vein formed by fusion
of subclavian and internal jugular vein was brachio cephalic vein (BV) under surface of SCM at level of
superior border of thyroid cartilage. No anomaly was
found on left side.

Discussion

Veins in the neck show considerable variations. They
are superficial or deep to the deep fascia, superficial
veins drain a much smaller volume of tissue than the
deep veins. The latter drain all but the subcutaneous
structures, mostly into the internal jugular vein and also
into the subclavian vein1. In the present case study it
was observed that most of the superficial and deep veins
are draining into the subclavian vein. Internal jugular vein
is mainly draining the brain in this case. As we know
facial vein joins with anterior division of retromandibular
vein below the angle of mandible forms the common
facial vein that drains into the internal jugular vein and
posterior division of retromandibular vein joins with
posterior auricular vein forms external jugular vein that
drains into subclavian vein. In the present case facial
vein joined with the lingual vein then joined with superior
thyroid vein and that joined with retromandibular vein
formed a common vein that drained into subclavian vein
instead of draining into the internal jugular vein. Prakash
et al reported the termination of left common facial vein
into left subclavian vein2. D’silva et al have reported the
left facial vein draining into external jugular vein3. After
extensive literature search, the author found the various

jugular vein (EJV) which crossed the SCM and upper
part of posterior triangle and drained into right subclavian
vein 5cm above the lateral third of clavicle. In the present
anomalous course of neck veins but no case report on formation of brachiocephalic vein in the neck was found. Usually brachiocephalic vein is formed at the root of the neck on both the sides just posterior to the sternal head of clavicle by joining of internal jugular with subclavian vein. In this present case brachiocephalic vein was formed at the level of superior border of thyroid cartilage. So in the present case, subclavian vein is joining the internal jugular vein at higher level. Subclavian vein (preferably right side) is important for central venous access, central line placement and cardiac catheterization. Central lines are introduced to administer parenteral fluid for medications and to measure\(^4\). This knowledge of variation is important to clinician while doing the procedure. Budhiraja et al showed the left brachiocephalic vein crossed the trachea in the neck obliquely at close proximity with lower border of thyroid gland\(^5\). In patients with congenital heart disease the brachiocephalic vein was in an anomalous position below the aortic arch\(^6\)\(^7\)\(^8\). This aberrant brachiocephalic vein is of importance to cardiothoracic surgeon, cardiologist and general surgeon to prevent unusual bleeding complication. This position of brachiocephalic vein is very much prone to be damaged during thyroid surgery and tracheostomy.

**Embryological basis**

The cranial portions of the anterior cardinal veins in the developing cervical region give rise to the internal jugular veins; the subclavian vein, which coalesces from the venous plexus of the left upper limb bud, also empties into the proximal part of anterior cardinal vein. In the present case study the venous plexus of the right upper limb bud could have joined with anterior cardinal vein at higher level\(^9\).

**Conclusion**

The knowledge of variation in facial vein is important to plastic surgery for reconstruction flap surgery. Aberrant site of termination of subclavian vein and formation of brachiocephalic vein is important to know the clinician during subclavian catheterization, central venous access and cardiac catheterization to prevent damage to veins and cause bleeding complication.

**References**


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