Duplication of internal jugular vein: a rare case report and review of literature

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Abstract

Internal jugular vein being the major landmark during neck surgery, variations in the internal jugular vein are associated with injury to the vessels, failure to remove all cancerous tissues and incorrect diagnosis of neck pathology. Duplication of the internal jugular vein is a rare anomaly found during the dissection of the neck. Here we are reporting this extremely a rare anomaly, where there is high bifurcation of left internal jugular vein, bifurcation of left common carotid artery was high up just below the mandible, superior thyroid artery arising from left common carotid artery.

This work was done in: Department of ENT and Head and Neck Surgery, Ganesh Man Singh Memorial Academy of ENT and Head and Neck Studies, TU Teaching Hospital, Kathmandu, Nepal.

CASE REPORT

A 22 years old male from a remote area of Nepal admitted in the department of ENT and Head and Neck Surgery ward of TU Teaching Hospital, Kathmandu with the diagnosis of papillary carcinoma of the thyroid (staging-T2N1bMo). He underwent total thyroidectomy with left radical neck dissection. Peroperative findings included a hard nodule on the left lobe of the thyroid and multiple lymph nodes from level two to level six. There was a high bifurcation of the left internal jugular vein, bifurcation of the left common carotid artery was high up just below the mandible, superior thyroid artery arising from left common carotid artery and spinal accessory nerve between the bifurcated internal jugular veins. (Fig:1, 2). The contralateral side was normal. The postoperative period was eventful.

Figure 1

Figure 1: per-operative diagram showing bifurcated internal jugular vein, high bifurcated common carotid artery and position of spinal accessory nerve.

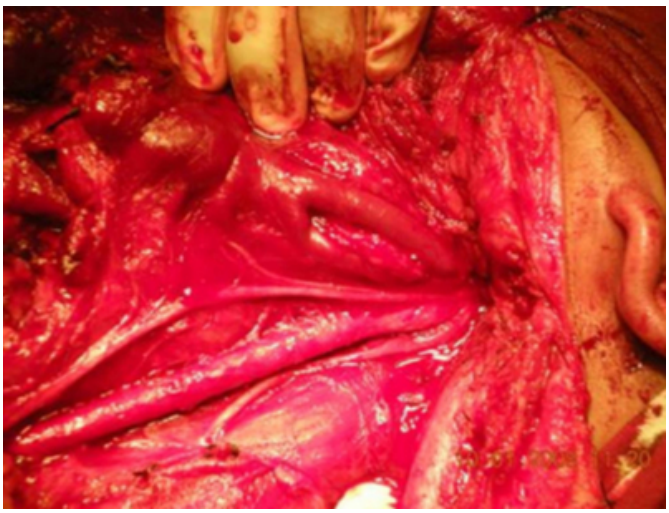

Figure 2

Figure 2: per-operative diagram showing superior thyroid artery arising from common carotid artery

DISCUSSION

The duplication of internal jugular vein (IJV) may have significant clinical consequences [1]. The exact incidence is unclear because of the confusing terminologies, like duplication or fenestration. Duplication of the internal jugular vein is a rare anomaly found during the dissection of the neck. The reported incidence is 4/1000 of unilateral neck dissections [2]. Duplication usually involves the upper third of the vein and extends down to a variable level.1 Very few cases have been reported about low duplication [3, 4]. Duplication of the internal jugular vein is usually reported in association with phlebactasia, which is a soft non-pulsatile cervical swelling that increases in size during a valsalva maneuver [5,6]. The discovery of this anatomical variation has practical implication during cervical lymph node clearance, either functional or radical, during oncological surgery, necessitating identification of other vital structures around and branches of IJV [7].

Duplication of the internal jugular vein is a rare congenital anomaly. Embryologically, the origin of the internal Jugular vein is from the precardial vein. It has been postulated that, duplication may result from derangement from early development between the third and sixth gestational week 6.The common association with Phlebectasia suggests abnormal development of venous wall, possibly involving incomplete formation of the muscular layer. Internl jugular vein runs parallel to the common carotid artery within the carotid sheath until it joins the subclavian vein deep to the sternal end of clavicle. The IJV constitute one of two major pathways of intracranial blood [8]. Because of its constant and superficial position, it is frequently used for central venous access by emergency Physicians, cardiologists, oncologists and nephrologists [9]. IJV is also an important landmark for Radiologists and Surgeons. Because of the importance of IJV and posterior triangles in the neck dissections, this kind of anatomical variation has great significance in clinical practice.

Three theories have been put forward to explain duplication [2]. The vascular theory is the one that is usually accepted [2]. This theory suggests that duplication is thought to result from the appearance of a secondary venous ring at a lower level surrounding the spinal accessory nerve. The persistence of this secondary ring adult life may be important in the aetiology of venous duplication[2]. The neural hypothesis depends on the position of the spinal accessory nerve in relation to the transverse process of the atlas. The alteration of its position can disrupt the developing internal jugular vein and lead to its duplication. The bony hypothesis suggests that variation in the ossification of the bony bridges of the jugular foramen causes venous duplication. This theory does not explain the relation of the spinal accessory nerve to the duplicated internal jugular vein 2.

There are three different types of bony bridgings at the jugular foramen[10]. The bony bridging of the jugular foramen is established by the contact of the intrajugular process of the occipital bone projecting either from just above the hypoglossal canal (Type I) or from behind the hypoglossal canal (Type II) and secondary bony process emerging from the occipital bone in front of the intrajugular process of that bone (Type III) [10]. The third type could be associated with a high duplication of the internal jugular vein because of the presence of two bony partitions in the jugular foramen which would have been lead to division of the internal jugular vein into two parts.

The spinal branch of accessory nerve was found passing between anterior and posterior divisions of the vein which was similar to our findings. Besides duplication in our case, the superior thyroid artery was arising from common carotid artery and the bifurcation of common carotid artery was high up just below the mandible. These combination anomalies are extremely rare and only few cases are reported in the literature.

Thus internal jugular vein being the major landmark during neck surgery, variations in the internal jugular vein are associated with injury to the vessels, failure to remove all cancerous tissues and incorrect diagnosis of neck pathology.

Surgeons who perform these procedures should be aware of these variations. The present finding provides a chance to the new surgery students to learn the uncommon anatomical variations.

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