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Case Report

Internal jugular vein duplication-incidental finding: a rare case report

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ABSTRACT

Internal jugular vein duplication (IJVD) during neck dissection is a rare finding, with a 4/1000 incidence recorded in unilateral neck dissections. An intra-operative unilateral IJVD was identified as an unexpected finding in a 49-year-old gentleman who underwent surgery for upper gingivobuccal sulcus carcinoma. In case IJVD is present then high chances of injury to anterior compartment in early steps of neck dissection as it is present anterior and medial to Sternocleidomastoid muscle (SCM), while chances of injury to posterior compartment when addressing level II, III, and IV neck nodes. Though duplication has no physiological significance, it has clinical implications during interventional, surgical and other procedures, so detailed knowledge of this variation in anatomy helps in preventing untoward injury or misinterpretation. To understand the variation in anatomy, it is important to document the findings of this anomaly. Objective of case report is to explain the presentation of internal jugular vein duplication, its clinical consequences and to discuss literature present pertaining to its embryology.

Keywords: Internal jugular vein, Internal jugular vein duplication, Sternocleidomastoid muscle

INTRODUCTION

The internal jugular vein (IJV) begins in the jugular foramen, it is the major venous blood outlet of brain. The internal jugular vein is lateral to the internal carotid artery initially, and subsequently becomes anterolateral to the circumference of the artery. It descends along with the internal carotid artery and farther below with the common carotid artery and the vagus nerve. It connects the subclavian vein at its lower end to flow into the brachiocephalic vein.

IJV abnormalities might cause complications during interventional, surgical, or other procedures, increasing the complication rate. The internal jugular vein duplication (IJVD) is a rather uncommon congenital abnormality. The duplication can occur at any level, but it usually affects the upper third of the vein.[1] In a few cases, low duplication was detected.[2,3] We discuss our experience of incidentally detected unilateral IJVD in a case of carcinoma of right upper gingivobuccal sulcus with lymph node metastasis.

CASE REPORT

In April 2022, a 49-year-old gentleman reported to a tertiary care centre in North Karnataka with non-healing ulcer over right upper gingivobuccal sulcus and adjacent buccal mucosa. He had palpable right level I cervical lymph node. Biopsy confirmed it to be moderately differentiated squamous cell carcinoma. Computed tomography (CT) scan revealed ill-defined mucosal thickening approximately measuring 44×18 mm upper gingivo-buccal sulcus extending on the adjacent buccal mucosa. Superiorly the lesion extended to the floor of right maxilla with ill-defined focal erosive changes at right upper canine and 1st and 2nd premolar region with evidence of few small volume of enlarged lymphatics at right submandibular and level II, of which largest measuring

32×13 mm (Ib). The case was discussed in the institutional tumour board, and radical surgery with adjuvant radiation was planned. He underwent right partial maxillectomy and ipsilateral comprehensive neck dissection, preserving sternocleidomastoid, IJV, and accessory nerve. During neck dissection, after incising the carotid sheath, IJV was found to be duplicated into anterior and posterior components (Figure 1).

The vein duplication started below the jugular foramen. Below the level of the omohyoid tendon, the two components joined. The normal anatomical course of vagus nerve was normal. The postoperative period was uneventful.

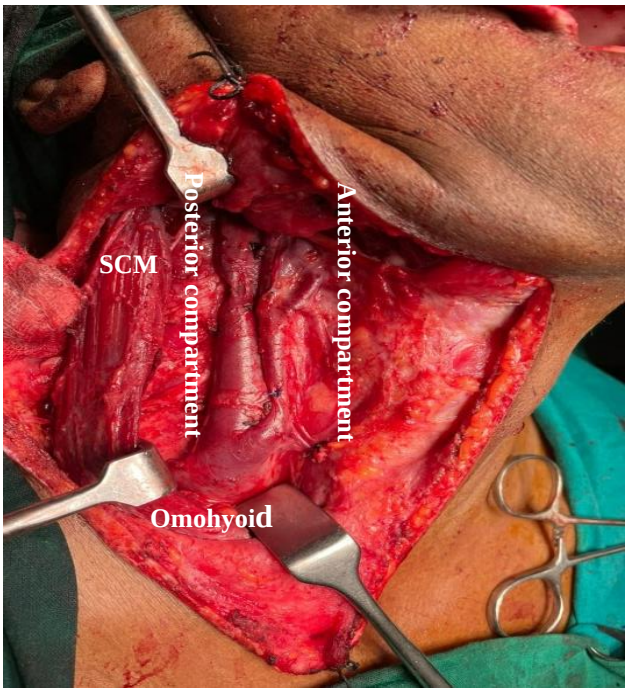

Figure 1: Internal jugular vein duplication.

DISCUSSION

IJVD is an infrequent vascular anomaly that might have serious clinical or intra-operative outcomes. For example, in severely sick patients, IJV is the most desired site for central venous pressure (CVP) assessment and central venous access. In addition, IJV is a useful diagnostic reference for cervical pathologies involving lymph nodes or venous thrombosis.

Due to the possibility of causing iatrogenic morbidity or inaccurate diagnosis as a result of unexpected IJV duplication, double IJV could have an impact on various clinical operations.

Similarly, because lymphatics run parallel to the IJV, which is regarded as a primary landmark during neck surgery, variations in the IJV are related to the risk of vascular injury and misinterpretation of neck pathology. Muscle, nerve, glandular tissue, and the IJV, as well as lymph nodes, are removed during radical neck dissections, which are commonly performed in cases with head and neck node metastases of squamous cell carcinoma. Due to the large area involved, duplicated jugular vein removal would be difficult, requiring ligation at additional sites, unexpected vessel injury, or the danger of inadequate removal of involved lymphatic tissue.

IJV arises in the mandibular and hyoid arch region embryologically from the ventral pharyngeal vein (VPV), which drains into the precardinal vein and forms the lower half of the IJV as the neck elongates.[4]

Three hypotheses were proposed to explain IJV duplication. The neuronal, skeletal, and venous systems are all involved.

Venous hypothesis

From the third to the eighth week of pregnancy, the development of cranial nerves, neurocranium, and neck veins begins.[5] Condensation of embryonic venous capillary plexuses occurs during the formation of neck veins.[5] The persistence of two venous channels during condensation causes IJV duplication.[6]

Neuronal hypothesis

According to this hypothesis, embryonic venous capillary plexuses entrap accessory neurons during development.[6] The formation of anterior and posterior VPV may result from nerve entrapment. As the embryonic neck elongates and its myotome and accessory n. migrate downwards, the length of the duplication increases.

Bony hypothesis

It states that during ossification, jugular foramen duplication leads to IJV duplication.[6] The neurocranium begins to develop in the fourth week of pregnancy and is mostly ossified by birth. Duplication and triplication of the foramen were discovered in a study of foetal skulls while looking at jugular foramen variations.[7] In all jugular foramen variations, IJV exits through the posterior-most foramen and remains single.[7] Thus, the bony hypotheses do not explain the emergence of IJVD.

CONCLUSION

Over the last few decades, advances in imaging and surgical approaches have revealed an increase in the number of cases of duplicated IJVs. The current case, like our patient, provides information other than clinical presentation. Although the possibility of duplicated IJVs is a rare occurrence, clinicians should be aware of it. We would conclude that, at this time, there is no evidence that duplicated IJVs cause any negative health outcomes. A cautious approach should be taken if such an anomaly is discovered. Internal jugular vein duplication is a rare congenital anomaly and needs further research.

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