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An unusual relationship of spinal accessory nerve and internal jugular vein – An alert for the oral and maxillofacial surgeon

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SUMMARY

Anomalous anatomical relationship of spinal accessory nerve and internal jugular vein can make neck dissection very challenging while removing nodal metastasis in oral cancer. We report here one such situation which was a surprise finding on table. We feel all clinicians encountering internal jugular vein should be aware of this to avoid neurovascular complication.

Keywords: internal jugular vein, spinal accessory nerve, fenestration.

INTRODUCTION

Neck dissection (ND) is a globally accepted surgical procedure in the management of cervical metastasis secondary to oral cancer. Original operation described by crile (1) results in shoulder dysfunction in large number of patients. Subsequently modified radical neck dissection(MRND) introduced by Suarez (2) and selective neck dissection (S ND) (3) were described to enable preservation of non lymphatic structures without affecting oncologic outcome. These three structures are spinal accessory nerve(SAN), internal jugular vein (IJV) and sternocleidomastoid muscle. SAN is closely related to IJV in the upper neck. In the vast majority of cases it is said to pass lateral or medial to vein . Here we report a case where SAN was found to pass through a fenestration in IJV , which is a quite uncommon finding with important implications for surgical management.

CASE REPORT

A 43 year old male patient presented with carcinoma of left buccal mucosa which was clinically staged as $T_2N_1M_0$. He was scheduled for wide excision and MRND and free radial forearm flap reconstruction.

During surgery, while searching for SAN in the upper neck, IJV was found to have fenestration at the level of hyoid (tendon of digastric muscle). It was about 2.5 cm long and SAN was found to enter superior end of the fenestration. The medial and lateral branches were of approximately equal diameter. Anterior branch of fenestration received common facial vein and superior thyroid vein (Figures 1, 2) The dissection was done carefully avoiding neurovascular injury. Post operative recovery was uneventful.

DISCUSSION

Considering the large number of head and neck cancer patients treated worldwide every year, there are very few reports of fenestration in IJV. Often the terms fenestration and duplication have been used interchangeably, though these are different entities. Downie (4) clarified this in his report. After exiting jugular foramen, the IJV divides into two veins . It is said to be duplicated when these two distinct vessels enter the subclavian vein separately. Fenestration is said to be present when the branches rejoin proximal to the subclavian vein. Only one IJV terminates in the subclavian vein. It resembles an eye-of-the-needle appearance.

Thus the true prevalence of fenestration is difficult to estimate reliably. PubMed search of English language literature showed that there are very few case reports and small case series about this anomaly. Some of these are cadaveric studies (5).

The reported prevalence ranges from 0.4-0.9%, quite uncommon indeed (4-9).

IJV is routinely encountered by head neck surgeons as mentioned here. It will be of great help if the anomaly is reported beforehand by imaging. This

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is possible with contrast enhanced CT scan. However it must be admitted that both, radiologist and surgeon failed to recognize this before surgery in this case.

Importance for surgeon

The anomaly makes clearance of fibrofatty tissue more tedious. Very careful dissection needs to be done to avoid injury to SAN and resultant morbidity .Injury to IJV especially partial control without noting tributaries in relation to fenestration can result in troublesome haemorrhage.

The IJV is often used as a recipient vein for free flaps, thus fenestrations in the IJV could be involved in flap failure (8).

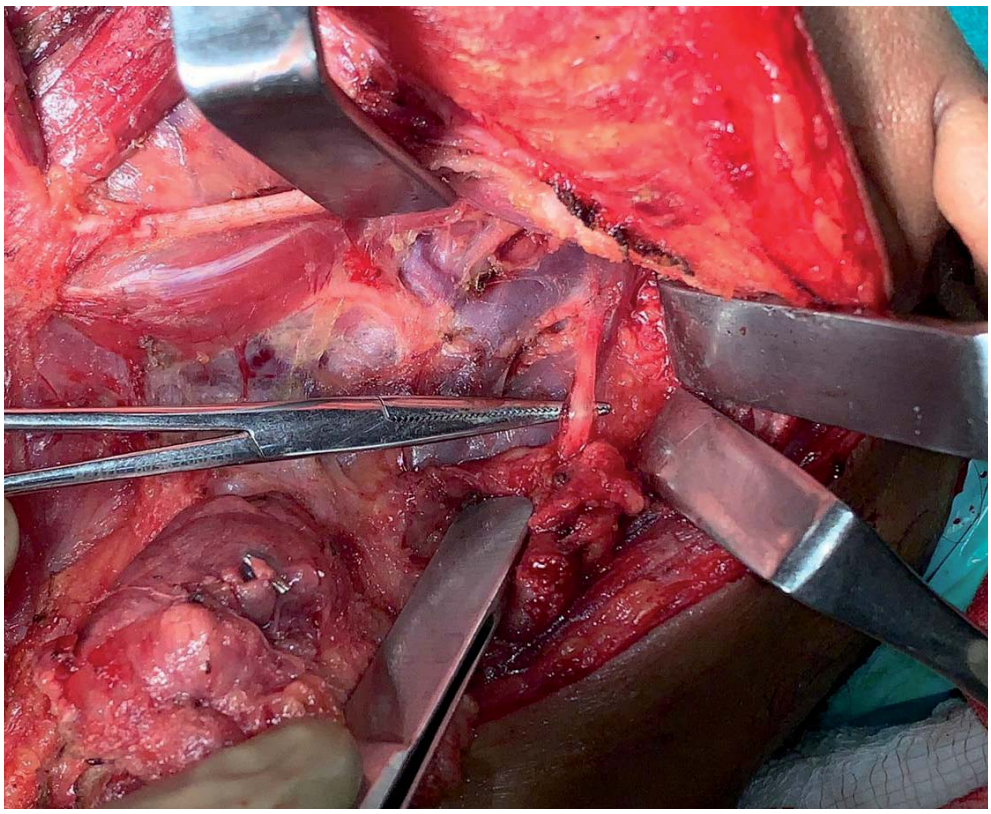

Fig. 1. closer view of fenestration. Mosquito forceps beneath SAN. common facial vein drains into anterior limb

Importance for other clinicians

IJV is also of importance to anaesthesiologist and intensive care physician for insertion of central venous line.

As it is so consistently positioned, percutaneous access for insertion of a central venous line is considered safe. However, variations in the IJV, such as a fenestration, could result in difficulties inserting the catheter. Doppler ultrasound examination can enable the clinician to avoid injury to the vein and plan the procedure accordingly.

Etiology

The embryological basis for this anomaly is far from clear.

Different theories have been put forth in order to explain the anomaly (4, 10). These are vascular, neural, bony, and muscular hypotheses. The vascular hypothesis is generally accepted in the literature (9). It is based on the fact that the origin of the IJV develops from the precardinal veins that drain blood from the cranial aspect of the embryo, and the nerves generally emerge after the vessels. The venous duplication could result from inadequate condensation of the embryonic capillary plexus that develops posterior to the precardinal veins. Persistence of this capillary plexus may lead to duplication of the IJV in conjunction with the transvenous passage of

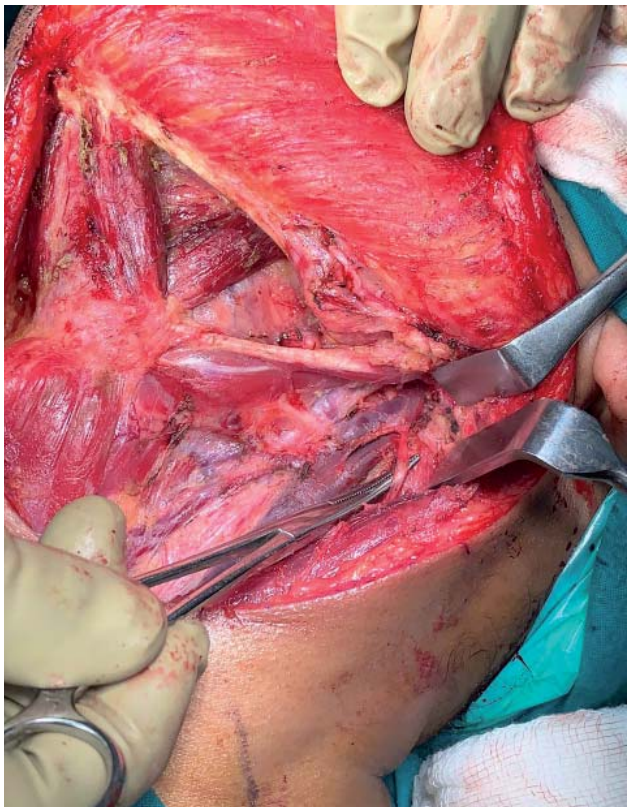

Fig. 2. SAN entering fenestration in IJV at the level of hyoid bone

the SAN. The neural theory suggests that branching of the IJV is the result of obstructed growth by the SAN during development. In the bony theory, aberrant ossifications or osteophytes could cause bony bridges responsible for venous partitioning. The muscular theory suggests the division of the IJV caused by the posterior belly of the omohyoid muscle.

CONCLUSION

The presence of the reported anomaly may have serious implications for management of patients. Head and neck surgeons, radiologists and intensive care practitioners should be made aware of this rare anomaly to prevent inadvertent neurovascular injury.

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