IJCRR
Vol 06 issue 02
Section: Healthcare
Category: Case Report
Received on: 26/11/13
Revised on: 12/12/13
Accepted on: 10/01/14

NARROWING OF JUGULAR FORAMEN DUE TO BONE GROWTH AT JUGULAR FOSSA IN THREE DRIED SKULLS – A CASE REPORT

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ABSTRACT

Variations in the size and shape of jugular foramen are of considerable importance. An abnormal and partial obliteration of jugular foramen by a bony growth were observed in three skulls during osteology demonstration classes for medical undergraduates. Jugular foramen transmits important cranial nerves (IX, X, XI), internal jugular vein and inferior petrosal sinus. So, narrowing of the jugular foramen might result in neurovascular symptoms, a condition called Vernet's syndrome, which is discussed along with the case. The knowledge of this bony abnormality is of great importance to neurologists, radiologists, anthropologists and neurosurgeons.

Keywords: Jugular Foramen, Jugular Fossa, Skull Base, Vernet's Syndrome

INTRODUCTION

The jugular foramen is an irregular hiatus, which lies at the posterior end of the petro-occipital suture between the jugular process of the occipital bone and the jugular fossa of the petrous part of the temporal bone[1].

A fibrous or osseous bridge divides the foramen into two compartments. The anteromedial compartment, the pars nervosa, transmits glossopharyngeal (IX) nerve and inferior petrosal sinus. The pars vascularis, posterolateral compartment, contains the jugular bulb and transmits vagus (X) and spinal accessory (XI) nerves[2]. Tekdemir I, et al reported that a dural septum separates the IX cranial nerve from the X and XI cranial nerves[3].

Vernet's syndrome is characterized by loss of taste sensation over the posterior 1/3rd of the tongue, paralysis of vocal cords along with dysphasia and weakness of sternocleidomastoid and trapezius muscles, which are due to involvement of cranial nerves IX, X and XI respectively.

CASE REPORT

During routine osteology demonstration classes for the undergraduate medical students, an unusual narrowing of jugular foramen was observed in 3 dried skulls. Measurements of jugular foramen of the three skulls are mentioned in the table – 1 and are shown in the figure 1, 2 and 3. The jugular foramen was reduced to less than half of its size on one side in specimens 2 and 3 when compared to their counter side, where as specimen 1 showed marked narrowing bilaterally. No other abnormalities were observed in the skulls.

DISCUSSION

The jugular foramen of the skull transmits the sigmoid sinus, inferior petrosal sinus, ninth, tenth and eleventh cranial nerves. The jugular fossa lodges the superior bulb of the internal jugular vein.

In a morphometric analysis by Lang and Schreiber[4] (as quoted by Thomas J. Vogl et al[4]) showed that the mean dimensions of jugular

foramen are 14.5 × 7 mm at the internal skull base and 9 × 17 mm at the outer surface.

Sturrock, et al[5]; Hatiboglu MT, et al[6] and Hakuba A, et al[7] observed in their individual studies, that the pars vascularis is usually larger on the right side causing asymmetry of the jugular foramina.

In a study on 300 dried skulls Hatiboğlu MT, et al[6], observed a bony dome in jugular foramen, bilaterally in 49%, on the right only in 36%, on the left only in 6%; it was absent bilaterally in 10.3 % specimens. A Complete septation by a bone growth occurred in 5.6% on the right and in 4.3% on the left side, partial septum was observed in 2.6% on the right and in 19.6% on the left side. Danny R. Sawyer, et al[8], observed bridging of jugular foramen in 8.1% of cases.

S Nayak[9] and Rakhi Rastogi, et al[9] observed a slit like jugular foramen, due to partial obstruction of jugular foramen by an abnormal bony growth at jugular fossa, In the present case also such abnormal slit like jugular foramen were observed in three dried skulls. One out of the three specimens showed bilateral narrowing and the remaining two showed narrowing on one side only.

Reduced size of jugular foramen and jugular fossa might cause neurovascular symptoms which can mimic the symptoms caused by hyper vascular glomus jugulare tumors, neural sheath tumors like schwannomas, jugular meningiomas or nodules reducing the size of foramen in Varicella zoster infection. Superior bulb of internal jugular vein may be compressed by the bony growth in the jugular fossa which can result in venous congestion in the cranial cavity. The compression of glossopharyngeal, vagus and spinal accessory nerves might result in vernet's syndrome which is characterized by paralysis of pharynx, larynx and palate.

CONCLUSION

The anatomical variations like reduced size of jugular foramen and jugular fossa warrant a careful attention during clinical diagnosis, as the structures of this region may be at risk during micro surgical procedures. So the knowledge of this bony abnormality is of great importance to neurologists, radiologists, anthropologists and neurosurgeons.

Competing Interests

The authors declare that we have no competing interests.

Ethical committee clearance

As the study included only human dried bones, ethical committee clearance was not taken into consideration. Authors will take the responsibility of any further allegations regarding ethical clearance that arise from the study.

ACKNOWLEDGEMENTS

Authors acknowledge the immense help received from the scholars whose articles are cited and included in the references of the manuscript. The authors are also grateful to scholars / authors / editors / publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

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Table No.1, showing the measurements of left and right jugular foramen of three specimens

Specimen No.	Left	Right
1	12 x 2 mm	10 x 5 mm
2	10 x 4 mm	14 x 11 mm
3	12 x 5 mm	17 x 12 mm

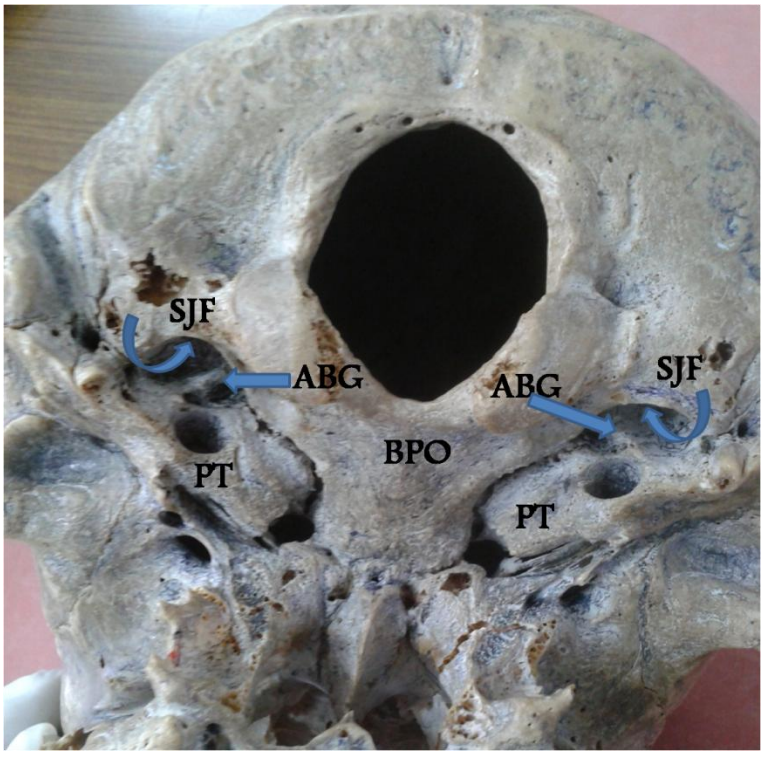

Figure No.1 Skull base showing bilateral narrowing of jugular foramen due to abnormal bone growth. (BPO: Basal part of occipital bone, PT: Petrous part of Temporal bone, SJF: Slit like jugular foramen, ABG: Abnormal bone growth)

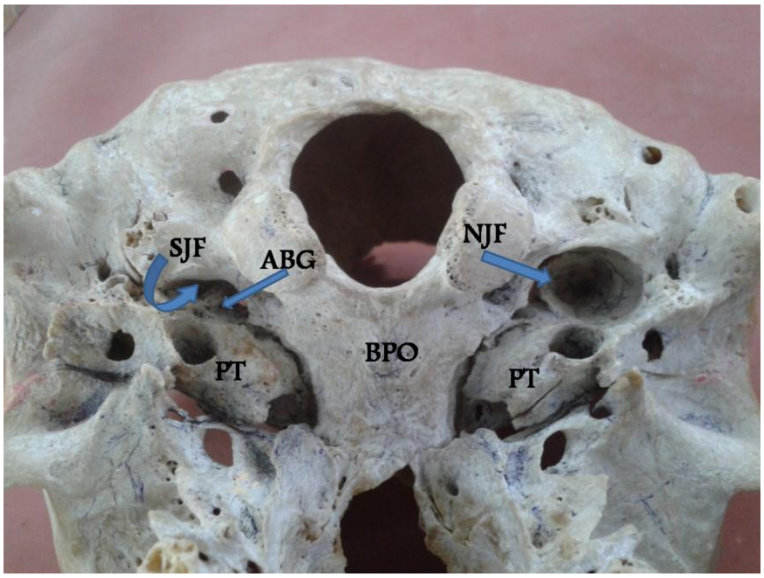

Figure No.2 Skull base showing unilateral narrowing of jugular foramen due to abnormal bone growth. (NJF: Normal jugular foramen, BPO: Basal part of occipital bone, PT: Petrous part of Temporal bone, SJF: Slit like jugular foramen, ABG: Abnormal bone growth)

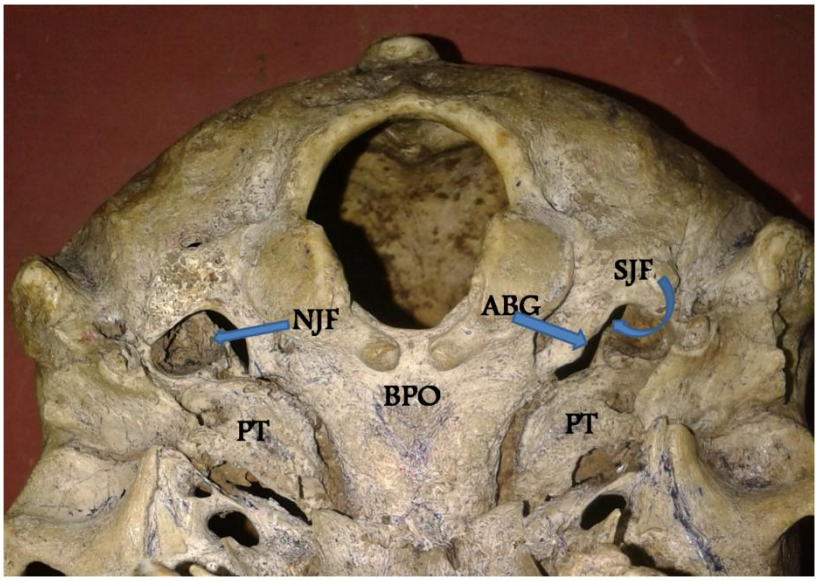

Figure No.3 Skull base showing unilateral narrowing of jugular foramen due to abnormal bone growth. (NJF: Normal jugular foramen, BPO: Basal part of occipital bone, PT: Petrous part of Temporal bone, SJF: Slit like jugular foramen, ABG: Abnormal bone growth)