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Case Report

# Isolated glossopharyngeal and vagus nerve palsy due to fracture involving the jugular foramen – Report of three cases

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ABSTRACT

Paralysis of the lower cranial nerves in closed head injuries is very rare. Only sporadic cases of post-traumatic lower cranial palsy have been documented so far. We report 3 such cases who presented with lower cranial palsy due to fracture of the base of skull. They were managed conservatively with enteral feeding and steroids. Two patients recovered completely and one patient could achieve only partial recovery at one-year follow up.



## 1. Introduction

Paralysis of the lower cranial nerves in head injuries is very rare. Only sporadic cases of post-traumatic involvement of the lower cranial nerves have been documented so far, and the majority of them followed gunshot wound or penetrating injury of base of skull and high cervical region.[1,2] From the available literature, we have been able to collect only a few case reports of lower cranial nerve palsies that followed cranial trauma without any evidence of neck injury. We report three more cases of lower cranial nerve palsies due to fracture base of skull following blunt injury to the head.

## 2. Case 1

A 12-year-old male child was admitted with a history of fall from a tree. His GCS on admission was $E_2V_2M_5$. A CT scan of the head showed right frontal EDH, which was evacuated by a right frontal trephine craniotomy. Postoperatively, the patient's GCS improved to $E_4V_5M_6$. On the 2nd post-op day, the patient complained of difficulty in swallowing and regurgitation of food from the nose. On examination, the gag reflex was diminished on the left side. HRCT of the head showed fracture base of skull involving left jugular foramen (Fig. 1). MRI of the brain did not show any parenchymal abnormality. Supportive treatment in the form of Ryle's tube feeding and steroids in a tapering dose was given. The patient gradually improved with complete recovery in four weeks.

## 3. Case 2

A 55-year-male was admitted following a roadside accident. On admission, the GCS of the patient was $E_1V_1M_3$. A CT scan of the head showed multiple small hemorrhagic contusions.

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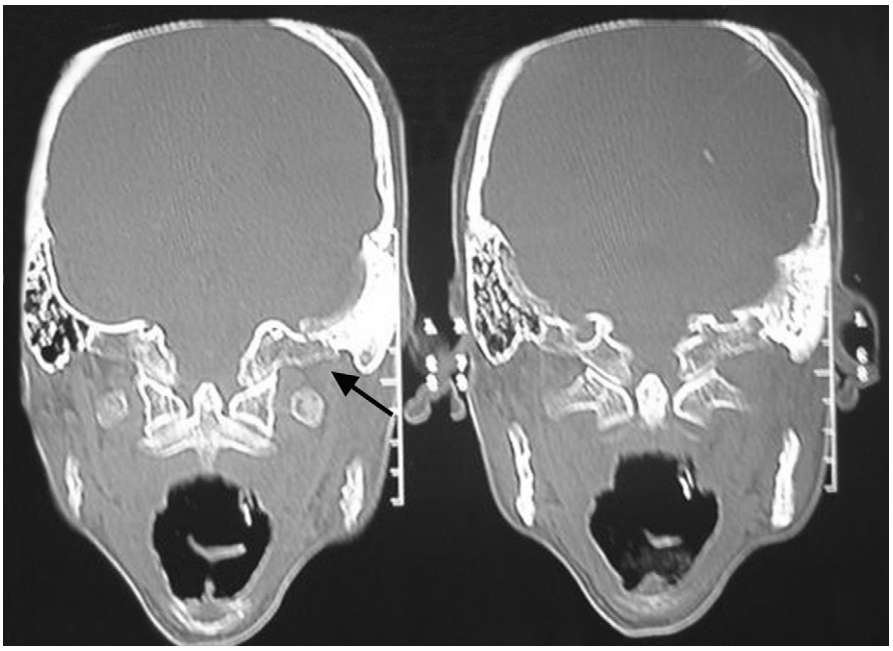

**Fig. 1 – Coronal CT-scan showing fracture involving left jugular foramen (arrow).**

Tracheotomy was done and the patient was managed conservatively with IV dehydrants and supportive treatment. The GCS gradually improved to $E_4V_TM_5$ but he had difficulty in swallowing. On examination, there was pooling of saliva in the mouth with absent gag reflex on his left side. HRCT of head depicted a left basi-sphenoidal fracture involving the jugular foramen (Fig. 2). Supportive treatment was given in the form of Ryle's tube feeding and steroids. The tracheotomy tube was removed on the 12th day of trauma. He was discharged with GCS of $E_4V_4M_6$ and was on Ryle's tube feeding. Steroids were given for six weeks in a tapering dose. The patient had partial recovery of the 9th and 10th cranial nerves at one-year follow up. The swallowing therapy was advised in which he was positioned to facilitate swallowing without damage on healthy side. This was done by turning his head to the damaged side which closed the pyriform sinus and directed the food down to normal side. Within two weeks of this treatment regime, the patient could take sufficient oral feed and fluids without aspiration.

## 4. Case 3

A 15-year-old boy was admitted with a history of trauma by a wooden stick followed by transient loss of consciousness, difficulty in swallowing and dysphonia. On admission, the GCS was $E_4V_3M_6$. His gag reflex was diminished and his voice was hoarse with a nasal twang. His tongue was deviated to right side when asked to protrude (Fig. 3). HRCT with 3-D reconstruction showed a fracture of base of skull involving right side jugular foramen. The patient was managed conservatively with steroids for 6 weeks in tapering dose. The

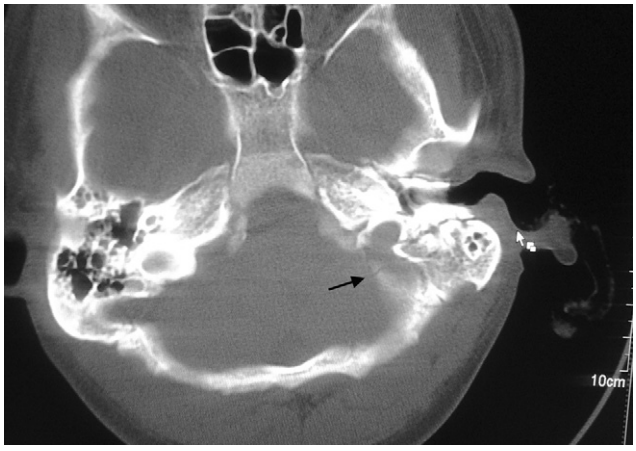


**Fig. 2 – Axial CT-scan showing fracture involving left jugular foramen (arrow).**

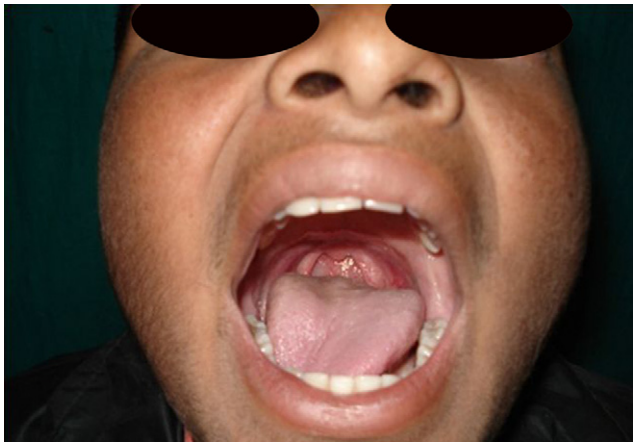

**Fig. 3 – Photograph showing lower cranial nerve palsy on right side.**

lower cranial nerve palsy improved completely at 3 months follow up.

## 5. Discussion

The jugular foramen is bounded anterolaterally by the petrous bone and posteromedially by the occipital bone.[3] It is divided by fibrous and occasionally by a bony septum into a smaller anteromedial neural compartment (pars nervosa) and a larger posterolateral vascular compartment (pars vascularis).[3] It varies in size and shape in different crania and from side to side in the same individual with right being usually larger.[3,4] It is traversed by the glossopharyngeal (IX), vagus (X) and spinal accessory nerve (XI), the inferior petrosal sinus, the posterior meningeal artery and the jugular vein. These structures are prone to get involved in cases of the fracture of base of skull involving the jugular foramen and resulting in characteristic syndromes. Vernet's syndrome refers to IX, X and XI nerve palsies.[5–7] The Collect-Sicard syndrome is characterized by paresis of IX, X, XI and XII nerve.[1,6] Basal skull fractures with lower cranial nerve palsies following blunt trauma head are rare but perhaps underestimated. Among the cases of jugular foramen fracture, 23 cases have been reported up to 2005, 12 on left side, 5 on right side and 5 were bilateral.[5] We report 3 such cases, 2 on left side and 1 on right side. The exact mechanism that results in injury to these nerves in head injury is not clear but different mechanisms have been proposed such as small hematoma compressing these nerves,[1,5] direct nerve compression by displaced segment[8,9] or fracture related edema.[5] Delayed occurrence of palsies might result due to the fracture repairing processes with exuberant ossification or ischemic damage.[5,6,9] Both the literature and our own experience show that left side palsies are commoner than right side most probably due to smaller size of left foremen leading to early compression or ischemia.[5]

High resolution CT scan is the modality of choice for diagnosis of skull base fracture and foraminal anatomy.[1,3,5,6] It can also pick up any associated cranio-vertebral junction abnormality. MRI is the investigation of choice for imaging the cranial nerve pathology, brain stem infarcts, extra-axial bleeding and target organ pathology.[5] It is complimentary to CT for ruling out ligamentous injury in condylar fracture. The management of patients consists of supportive measures with enteral nutrition until resumption of oral feeding. Direct surgical treatment is not advisable except for co-existent CVJ instability. Most of the authors do not support the use of steroids.[1,5,6] But we used steroids in all of 3 cases and there was complete recovery in 2 cases and partial recovery in 1 case. The use of steroids is empirical to decrease the edema as used in traumatic optic nerve injury. The natural course of post-traumatic lower cranial palsies is of incomplete recovery in the majority of case but in 2 of our cases there was complete recovery. Swallowing therapy was advised to the patient in whom there was partial recovery.[8]

## 6. Conclusion

Head injured patients presenting with swallowing difficulties or dysphonia it is mandatory to investigate the skull base at the jugular foramen and CVJ. HRCT with 3-D reconstruction allows detection of even small fractures that involve this area. Direct surgical treatment is not advisable except for coexistent CVJ instability. The therapeutic approach consists of supportive enteral and swallowing rehabilitation. The use of steroids may improve patient outcome.

## Conflicts of interest

All authors have none to declare.

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