

# Post Traumatic Mask Face, Diagnostic Dilemma in Bilateral Traumatic Facial Palsy. Case Report

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## ABSTRACT

*Traumatic temporal bone fractures, most of the time presents with complications in the form of cerebrospinal fluid leak, facial nerve injury as it enters the petrous part of temporal bone and also sometimes hearing loss due to concomitant vestibulocochlear nerve injury.<sup>2,3,4</sup> Second most vulnerable nerve in head injury is facial nerve, with olfactory nerve being the first, and one reason for this is the tortuous bony course in the skull base and temporal bone.<sup>8-12</sup> Evaluating facial nerve injury in head injury patient start with an inspection of the temporal bone for any signs of injury, i.e. laceration or visible auditory cartilage or any hematomas or bruises over mastoid, which is called Battle sign.<sup>10-12</sup> Functional testing of facial nerve should be recorded in head injury with temporal bone fracture as soon as possible.<sup>1</sup> 3- D CT reconstruction of the skull and temporal bone should be carried out when there is suspicion of facial nerve injury.<sup>11,12</sup> Complementary electro diagnostic testing should also be performed in order to assess the severity of facial nerve injury.<sup>2,3,4</sup> These all helps in early detection and further management of facial nerve injury.<sup>5,6,7,11</sup> We presented a case of 18years old male who had road traffic accident on 29.10.2018. This patient suffered with the head injury with bleeding from nose and right ear. The mask face of the patient, due to bilateral facial nerve injury could not be recognized at initial presentation, which was diagnostic dilemma.Also, this case was managed non-surgically, which may suggest that a majority of traumatic facial nerve injury can be managed non- surgically.*

**Keywords:** *Facial Nerve Injury FNI, Temporal Bone Fracture TBF, Bilateral facial palsy BFP, Cerebrospinal Fluid Leak CSF, Hearing loss, Anterior cranial fossa, Middle Cranial Fossa, Posterior Cranial fossa*

## INTRODUCTION

Traumatic head injury with temporal bone fracture most of the time present with traumatic facial nerve palsy.<sup>1,2</sup> But bilateral temporal bone traumatic fracture with bilateral facial palsy is very rare, and also a diagnostic dilemma because of not early recognition of facial asymmetry. Most patients with bilateral facial palsy due to trauma had serious underlying skull base fractures, which can lead to cerebrospinal fluid leak and also can lead to hearing loss, and for this reason, such patients should always be admitted in a Neurointensive care unit for further management and proper work up for severity of injury.<sup>1,3,5</sup> Second most vulnerable nerve in head injury is facial nerve, with olfactory nerve being the first, and one reason for this is the tortuous bony course in the skull base and

temporal bone.<sup>8,9</sup> Broadly temporal bone fractures are of two types, i.e. Transverse fractures and longitudinal fractures.<sup>3,4,5,8</sup> There is a greater incidence of facial nerve injury in transverse temporal bone fracture than longitudinal temporal bone fractures, i.e.60-70 percent to 30-40 percent respectively .<sup>8,9</sup> Being the thickest and its pyramid shape much force is needed to fracture the temporal bone, i.e. 1300 to 1800 Ib.<sup>8,9,11</sup> Evaluating facial nerve injury in head injury patient start with an inspection of the temporal bone for any signs of injury, i.e. laceration or visible auditory cartilage or any hematomas or bruises over mastoid, which is called Battle sign. Functional testing of facial nerve should be recorded in head injury with temporal bone fracture as soon as possible.<sup>1,5,10,11.</sup>

The facial nerve (7<sup>th</sup> N) is one of the twelfth

cranial nerve which has dual functions, both motor and sensory (nervous intermedius).<sup>2,4,5,12</sup> The facial nerve is located between pons and medulla oblongata proximally and more distally in front of the hindbrain. The vestibulocochlear nerve is medial to facial nerve as it enters internal acoustic meatus in the petrous temporal bone.<sup>5</sup> When the facial nerve enters into the middle ear, than on its medial wall also form sensory geniculate ganglion. Extra cranially through the stylomastoid foramen and parotid gland, gives rise to its branches, both motor and sensory.<sup>3-5</sup> The auricle, scalp and facial muscles, are supplied with a motor component of facial nerve. The Stapedius, Stylohyoideus, Buccinators and Digastric muscle posterior belly, receive motor supply from facial nerve.<sup>2,3</sup> The anterior two third of tongue taste fibers and middle ear somatic fibers receive sensory supply from facial nerve.<sup>2</sup>

### CASE REPORT

18 males had lacerated injury to the forehead and face secondary to road traffic accident on 29.10.2018. Presenting GCS 10/15 with bleeding from the right ear and bleeding from inside nose. However, after 3 hours of nasal packing in emergency, bleeding from nose stopped. Subsequently the patient developed a cerebrospinal leak from nose with right sided CSF otorrhea which resolved in 5 days. Clinically no spinal injury was found as the patient was irritable and was moving all four limbs with power ASIA E. Other systems were examined in detail. Chest, abdomen and musculoskeletal examination were unremarkable. Computed tomography (CT) scan of brain with 3-D reconstruction of the skull and temporal bone was carried out, which showed bilateral comminuted temporal bone fractures. Bilateral temporal bone fracture was extending longitudinally into mastoid regions. Left temporal minimal EDH was also observed. Patient was admitted in intensive care unit for head injury and intracranial pressure management according to standard protocol. On post-injury day 3, routine clinical examination revealed weakness in the muscles of facial expression bilaterally and also was not able to close both eyes normally. Clinically according to House-Brackmann score was grade 3, which is moderate facial injury. MRI brain was done which shows CSF signal intensities areas in the sinuses and bilateral nostrils with clinical findings of CSF rhinorrhea. Small intraparenchymal hematoma in left temporal lobe and hemomastoiditis also found.

Confirmatory electro diagnostic studies were performed, which revealed facial nerve injury bilaterally but with no evidence of distal axonal degeneration. Electro diagnostic studies and radiological investigations in the form of CT of the skull and brain and also MRI brain reveal grade 1 axonal injury, and so it was decided to manage this patient non-surgically. Patient managed medically, and prednisolone 1mg/kg given along with eye ointments to prevent exposure keratitis. After 8 day, inpatient medical treatment patient CSF rhinorrhea and otorrhea improved and also GCS improved to 13. Patient discharged in stable condition with GCS 15/15 on 10<sup>TH</sup> post trauma day. Prednisolone given for 3 weeks and electromyography performed at 6 weeks post trauma shows improvement. At 16 weeks facial palsy improved to House-Brackmann grade 1.

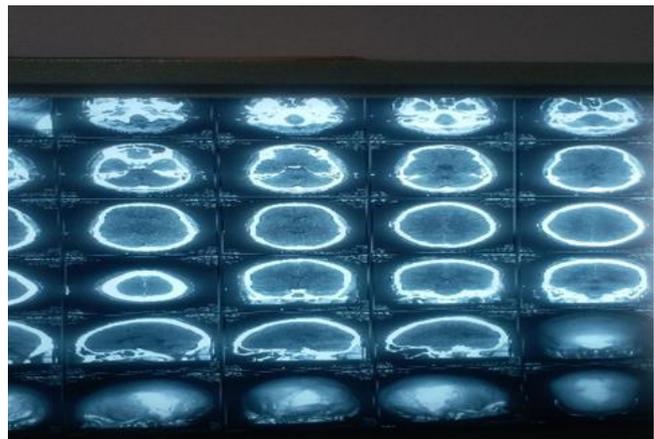


Fig. 1: CT Bilateral temporal bone fracture.

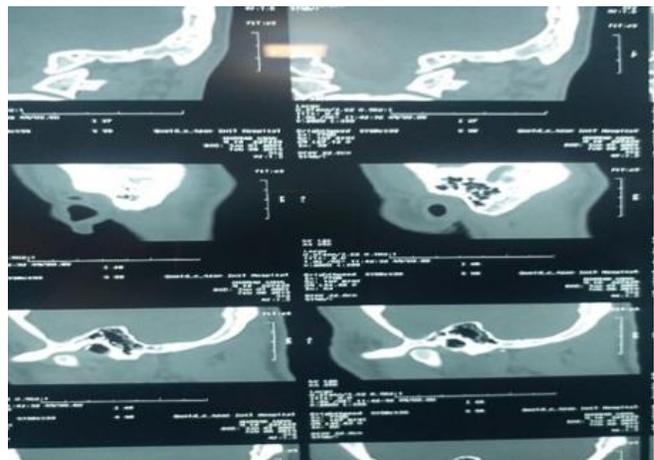
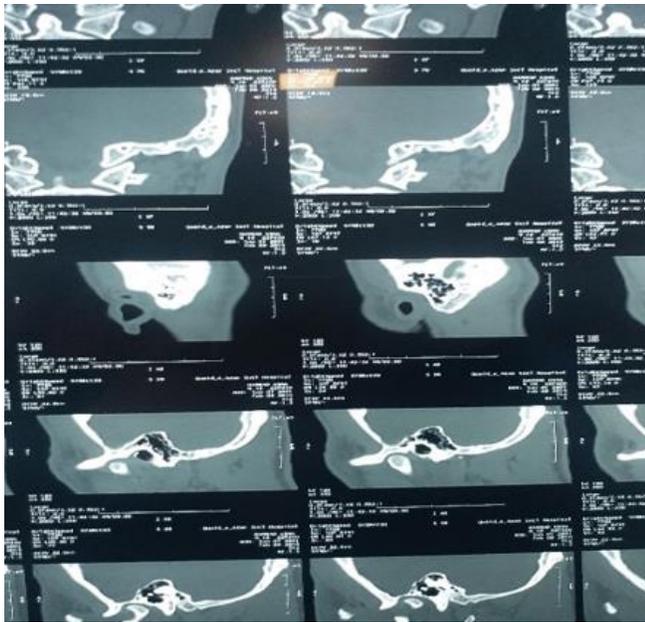
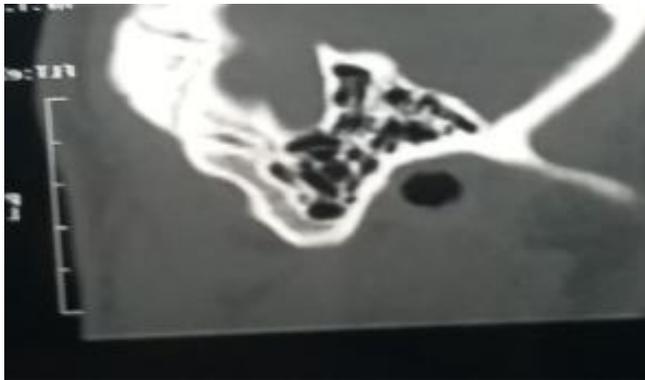


Fig. 2: CT Petrous temporal bone, longitudinal temporal bone fractures.



**Fig. 3:** Fracture line extending into mastoid.



**Fig. 4:** CT Bilateral temporal bone.



**Fig. 5:** CT Bilateral temporal bone.

**DISCUSSION**

Bilateral facial paralysis in head injury poses a great challenge in the clinical diagnosis, and one reason for this is the lack of facial asymmetry, as occurs in



**Fig. 6:** Follow-up visit in OPD showing bilateral facial palsy. CT of temporal petrous bone with comminuted fracture showing clearly the fracture type. Patient shown to improve in the follow up visits as shown in fig but with minimal deficit.

unilateral facial palsy.<sup>1,2</sup> The temporal bone is located in the thickest part of middle cranial fossa and it is pyramidal shaped. The precise anatomic relationship of the facial nerve to temporal bone, helps physician to localize the lesion of facial nerve accurately.<sup>1-4</sup> Skull base anatomic details need to be studied in detail, that helps not only in patient management, but also to avoid other complications associated with temporal bone fractures, apart from facial nerve injury, like hearing loss and CSF leak.<sup>6-9</sup> The skull base is broadly divided into three anatomical fossae, i.e. anterior fossa, middle fossa, and posterior fossa.<sup>10-12</sup> The anterior fossa is formed by, cribriform plate of ethmoid, sphenoid bone lesser wing and the frontal bone. The middle fossa is comprised of sphenoid bone greater wing and the temporal bone. Posterior fossa is mainly formed by occipital bone.<sup>11,12</sup>

It is well established fact that temporal bone fracture is more common in traumatic head injury, i.e 40 percent.<sup>12</sup> Fracture of temporal bone can lead to various serious complications like CSF leak and traumatic facial palsy.<sup>4,8,9,11</sup> Complete physical and neurological examination is mandatory in every head injury patient as soon as primary survey is complete. Inspection for Battle sign which is mastoid process ecchymosis and Raccoon eyes, i.e periorbital ecchymosis should always be looked for since both have positive predictive value of more than 95 percent in temporal and skull base fractures.<sup>10-12</sup> Broadly,

temporal bone fractures are of two types, i.e. transverse fractures and longitudinal fractures.<sup>3,5,7,10,12</sup> Literature review shows greater incidence of facial nerve injury in transverse fractures than longitudinal fractures, i.e. 60-70 percent and 20-30 percent respectively. When further studied the pathophysiology of traumatic facial nerve injury in longitudinal temporal bone fracture, it was found that longitudinal TBF also involve body of sphenoid bone and reaching opposite temporal bone, which results in bilateral FNP. If both 6<sup>th</sup> and facial nerves are not functioning, this suggests a lesion in pons of brain.<sup>5</sup> If facial nerve and vestibulochlear nerves are not functioning, this suggests a lesion in the internal acoustic meatus.<sup>7</sup> If the patient is sensitive to sound, lesion involves nerve to stapedius. If the lesion is proximal to chorda tympani the patient would have no sensation in the anterior two third of tongue.<sup>4,5</sup> In the assessment of facial nerve palsy, hearing should always be checked according to standard protocols, clinically and audiometrically.<sup>1,2</sup> 3D reconstruction of skull and temporal bone along with skull X-rays, are gold standards investigations to properly localize fracture the site in the temporal bone.<sup>1,2,3,7</sup> As MRI with gadolinium contrast is good for soft tissues pathology detection and is very useful to delineate facial nerve injury.<sup>7</sup><sup>3,4</sup> Also electromyography plays a key role for prognosticating and grading facial nerve injury.<sup>3-6</sup>

In terms of managing traumatic facial nerve injury, it is the severity and grade of facial nerve injury, which guides the physician in terms of either to manage medically or surgically.<sup>1-4</sup> When there is no gross radiographic pathology, electrophysiology can predict spontaneous recovery.<sup>2,3,7</sup> During medical treatment, recovery may be in delayed fashion and can manifest clinical improvement in 8-12 weeks.<sup>3,5,9,10</sup>

Surgical intervention is considered when EMG shows no regeneration despite aggressive medical therapy for 4-6 weeks, or when there is documented facial nerve transection, clinically complete facial palsy, i.e. 6/6, and radiology and EMG shows complete nerve transection.<sup>8,9</sup>

Which surgical technique to opt, also depends on a specific type of injury to the facial nerve. If facial palsy is deteriorating, surgical exploration may be carried out in the form of decompressing the facial nerve in the facial canal of the middle ear.<sup>10,11,12</sup> If a nerve is partially transected, it can be repaired with primary anastomosis.<sup>8,9,12</sup> But, if primary anastomosis is not

possible, than nerve graft can be done.<sup>2,5,9</sup> For complete facial nerve transection, hypoglossal to facial nerve anastomosis is carried out to improve cosmesis and facial function.<sup>9,10</sup> Local injection of Botox and gold-weight placement are reserved options for improving quality of life and enhance cosmesis.<sup>12</sup>

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**Additional Information**

**Disclosures:** Authors report no conflict of interest.

**Ethical Review Board Approval:** The study was conformed to the ethical review board requirements.

**Human Subjects:** Consent was obtained by all patients/participants in this study.

**Conflicts of Interest:**

In compliance with the ICMJE uniform disclosure form, all authors declare the following:

**Financial Relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

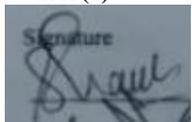
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