Temporal bone fracture

Temporal bone fractures are mostly due to high-energy head trauma with high rates of concurrent intracranial and cervical spine injury and belong to the wider spectrum of lateral skull base trauma.

Epidemiology

Temporal bone fracture is thought to occur in ~20% (range 14-22%) of all calvarial fractures. They have a prevalence of 3% of all trauma patients in one series [1].

Classification

Fracture of the petrous temporal bone is usually classified according to the main orientation of the fracture plane and/or involvement of the otic capsule.

Fracture orientation

Temporal bone fracture is described relative to the long axis of the petrous temporal bone, which runs obliquely from the petrous apex posterolaterally through the mastoid air cells. Using this plane, fractures may be classified as follows:

longitudinal fractures

transverse fractures

mixed fractures

Clinical features

Given that the temporal bone represents the most complex bone structure in the human body, containing a multitude of vital neurovascular structures, variable clinical presentations may arise from such fractures, ranging from asymptomatic courses to serious consequences, such as conductive and/or sensorineural hearing loss, vascular and/or cranial nerve injury as well as Cerebrospinal fluid fistula.

It is suggested by the Battle sign (post-auricular ecchymosis) and bleeding from the external auditory canal. As the fracture can sometimes involve the ossicles, inner ear and facial nerve, symptoms such as hearing loss, vertigo, balance disturbance, or facial paralysis may be present.

Diagnosis

Radiographic features

Head computed tomography with a petrous temporal bone fine slice (≤1 mm) multiplanar bone window reformats is the imaging modality of choice. Aside from the fracture lucency itself, which may be subtle on thicker slices or some planes, there may be secondary imaging features that, while less specific, raise concern in the setting of trauma for temporal bone fracture

The air surrounding the temporal bone

in the temporomandibular joint glenoid fossa

in the intracranial cavity (pneumocephalus)

in the soft tissues of the infratemporal or temporal fossae

Fluid opacification within the temporal bone

in the mastoid air cells

in the middle ear

in the external auditory canal

Outcome

Isolated temporal bone fractures usually have a good outcome in children, but in some cases they can be fatal or have permanent sequelae. Long term follow up is recommended [2)].

Delayed-onset or incomplete facial paralysis almost always resolves with conservative management, including the use of tapered-dose corticosteroids.

Complications

facial nerve involvement

facial nerve palsy

ossicular chain disruption

otic capsule involvement

vertigo and sensorineural hearing loss

cerebrospinal fluid (CSF) disruption

Traumatic cerebrospinal fluid otorrhea

Traumatic cerebrospinal fluid rhinorrhea

Meningitis

post-traumatic cholesteatoma

perilymphatic fistula

Treatment

Facial function following temporal bone fractures should be evaluated in the emergency room. If facial motion is noted at any time after the injury, surgical intervention is rarely indicated. Prophylactic antibiotics should be considered in temporal bone fractures when CSF fistulae are present. Surgical closure of a CSF fistula is indicated if it persists for > 7-10 days [3].

see Prophylactic antibiotics for temporal bone fracture.

1)
Zayas JO, Feliciano YZ, Hadley CR, Gomez AA, Vidal JA. Temporal bone trauma and the role of multidetector CT in the emergency department. Radiographics. 2011 Oct;31(6):1741-55. doi: 10.1148/rg.316115506. PMID: 21997992.
2)
Castellanos-Alcarria AJ, Navarro-Mingorance A, Reyes-Domínguez SB, León-León MC, Cepillo-Boluda A, López López-Guerrero A. [Severe temporal bone fractures in children: Clinical presentation, complications and sequelae observed in the last 11 years]. An Pediatr (Barc). 2015 Jan;82(1):e68-72. doi: 10.1016/j.anpedi.2013.12.003. Epub 2014 Jan 18. Spanish. PubMed PMID: 24444747.
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