Acute management of temporal bone fractures guideline

Initial resuscitation
ATLS approach
Primary management under emergency medicine, ICU and/or neurosurgical teams

CT head
Consider trauma ‘pan scan’

Suspected vascular injury
Angiogram + embolization, balloon occlusion or stenting

Assess for complications
• Assess facial nerve function at earliest possible opportunity (i.e. admission or extubation)
• Perform otoscopy and anterior rhinoscopy
• Ask about hearing loss, vertigo, and symptoms of CSF leak

Facial nerve palsy
• Eye protection: Viscotears QDS + PRN, Lacrilube ON, tape eye closed at night
• If delayed onset consider 5 days prednisolone 60mg
• Delayed onset has better prognosis, as does partial palsy (grade by House-Brackmann)

Complete
Nerve clearly transected or impinged on imaging?
High resolution CT temporal bones if not already performed

Yes
Surgical decompression +/- nerve grafting

No
Partial
Monitor for deterioration

Nerve conduction studies
• Electroneuronography (ENoG) + electromyography (EMG)
• Not sooner than 72 hours
• E.g. at 7 and 14 days

Summating potential <10%

Worsening

CSF leak
• β2-transferrin sample to confirm diagnosis
• Give pneumococcal vaccine
• Monitor for signs of meningitis
• If not contraindicated, elevate head and give stool softeners
• Consider lumbar drain if not settling

Surgical repair if persisting >10 days

Vertigo
• Manage conservatively where possible
• Avoid vestibular suppressants beyond 48 hours
• Give vestibular rehabilitation exercises

Follow up
• Follow up in ENT skull base clinic (e.g. at 6 weeks)
• Perform pure tone audiometry + tympanometry
• Reassess for late complications

Refer for hearing aids if needed
Initial resuscitation
Patients with temporal bone fractures will have suffered a significant head injury in order to impart sufficient force to fracture this bone\textsuperscript{1,2}. Many will have significant intracranial injuries\textsuperscript{3} requiring neurosurgical intervention and these will take priority. Many such patients will require monitoring in a Level 2 or Level 3 setting\textsuperscript{4}. Overall management is beyond the scope of this guideline but should follow the Brain Trauma Foundation guidelines\textsuperscript{5}.

CT head
As per NICE guidelines, patients with any sign of basal skull fracture should have a CT head performed within 1 hour\textsuperscript{6}.

Suspected vascular injury
Vascular injury may be suspected clinically or by the involvement of the carotid canal on CT\textsuperscript{7}. CT angiography is specific but not sensitive in diagnosing blunt cerebrovascular injury and therefore conventional angiography is preferred\textsuperscript{8}.

Consider high resolution CT temporal bones
Helical CT as performed in a trauma setting will identify over 98% temporal bone fractures\textsuperscript{3}; high-resolution dedicated CT of the temporal bones is indicated particularly where there are complications in order to precisely delineate the fracture line, or where a fracture is clinically suspected but not identified on initial helical CT\textsuperscript{9}. It is also useful after the acute period in diagnosis and surgical planning regarding ossicular dislocation and labyrinthitis ossificans\textsuperscript{10}.

Assess for complications
Complications of temporal bone fractures are common\textsuperscript{11}. Clinical examination should include the cranial nerves, otoscopy and anterior rhinoscopy.

Facial nerve palsy
The literature regarding management of traumatic facial nerve palsies remains inconclusive and large prospective studies are lacking\textsuperscript{12}. Modern high-resolution CT scans give excellent anatomic definition and can accurately predict the site of facial nerve injury in most cases\textsuperscript{13,14}; thus if obvious nerve compromise is demonstrated at CT, early surgical intervention is warranted. Earlier surgery has better outcomes than late intervention\textsuperscript{15} and it is therefore important to identify surgical candidates in a timely matter. Nerve conduction studies are used to identify candidates for surgery\textsuperscript{12}. Electroneuronography, if available, is ideal\textsuperscript{16} but should be performed not sooner than 72 hours as it is unreliable before Wallerian degeneration has taken place\textsuperscript{17}. Timings will vary by local availability; the example of 7 and 14 days post-injury is performed at the authors' trust. The prognosis in the case of delayed onset palsy is excellent with conservative management\textsuperscript{18} and very few cases will require surgery. The evidence for prednisolone is weak\textsuperscript{19}.

CSF leak
Most traumatic CSF leaks will resolve with conservative management and therefore a period of bed rest with measures to reduce fluctuations in intracranial pressure is recommended\textsuperscript{20}. β2-transferrin is reliable in diagnosing the presence of cerebrospinal fluid\textsuperscript{21}. The use of prophylactic antibiotics is controversial, but generally not recommended as there is a low rate of meningitis in traumatic CSF leak\textsuperscript{22}.
Vertigo

Vertigo is common following temporal bone fractures. Vestibular suppressants impair adaption and should therefore be avoided or, if required, used for as short a period as possible\cite{23}. Vestibular rehabilitation is effective and should be offered early\cite{24}.

Follow up

A majority of patients have long term complications 12 months after temporal bone fractures, which significantly affect quality of life and are frequently disabling\cite{25}. Further management is beyond the scope of this acute guideline, but further elective surgery may include ossiculoplasty for dislocation, tympanotomy for perilymph fistula, or repair of persistent CSF leak.

Refer for hearing aids if needed

All patients with hearing loss affecting their ability or hear or communicate should be referred for hearing aids\cite{26}.


