

## IMAGE

## Type II growing skull fracture in a 12-year-old girl

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### ABSTRACT

A 12-year-old female patient came to the Neurology Outpatient Clinic with the complaining of headache, frequent episodes of abnormal body movements and swelling in the right frontal scalp region. Her parents gave remote history of head trauma. History of trauma in a paediatric patient followed by the onset of gradually progressive swelling in the scalp along with radiological findings of calvarial defect and protrusion of gliotic brain tissue through it led to the diagnosis of growing skull fracture. Her parents were counselled about the surgical management for which they agreed. The scalp defect was repaired followed by uneventful post-operative period. She is on regular anti-epileptics for the episodes of seizures she had at the time of presentation and is on regular follow-up.

### Keywords:

Cranio-cerebral erosion; Computed tomography; MRI; Encephalomalacia.

A 12-year-old female patient came to the Neurology Outpatient Clinic with complaining of headache, frequent episodes of abnormal body movements and swelling in the right frontal scalp region. On examination, higher mental functions,

sensory, motor and cranial nerve examinations were normal and systemic examination was unremarkable. Local examination of the site of swelling revealed very soft compressible swelling with lack of tenderness, visible impulse on coughing, bruise, warmth and redness of skin over the swelling. The patient was referred to the Radiology Department for magnetic resonance imaging (MRI) of the brain. MRI of the brain revealed area of encephalomalacia and gliosis in the right frontal lobe with *ex vacuo* dilation of frontal horn of right lateral ventricle. The encephalomalacic and gliotic tissue was causing erosion of the calvaria forming a defect of size 2.5 cm along with extracranial protrusion of gliotic brain tissue through it (Figure 1).

On further interrogating, parents of the patient gave history of trauma to the head 8 years back, for which computed tomography of the brain was performed. Patient had serial scans taken in the months of March 2010 (at the time of trauma), November 2010 (for some neurological complains) and February 2014 (Figure 2).

Computed tomography of the head performed at the time of trauma (March 2010) in axial sections showed a non-displaced linear fracture line in the calvaria in right frontal region with overlying soft tissue scalp swelling. Computed tomography of the head performed after 8 months (November 2010) and after 4 years (February

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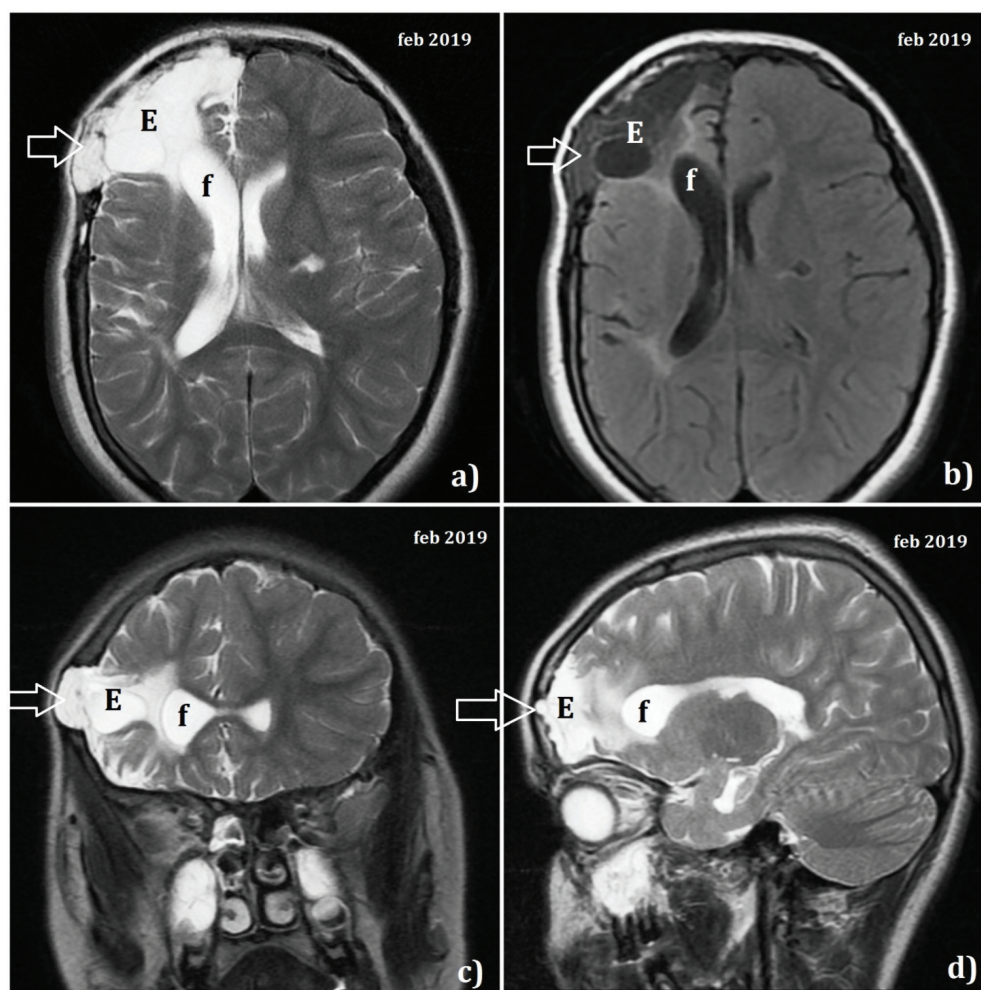
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**Figure 1.** Magnetic resonance imaging of the brain in (a) axial T2-weighted (T2W), axial Flair (b), coronal T2W (c), and sagittal T2W (d) revealed an area of encephalomalacia and gliosis (E) in the right frontal lobe with ex vacuo dilation of frontal horn (f) of right lateral ventricle. The encephalomalacic and gliotic tissue is causing erosion of the calvaria forming a defect (arrows) along with extracranial protrusion of gliotic brain tissue through it.

2014) showed gradually enlarging calvarial defect at the site of previous fracture with protrusion of encephalomalacic and gliotic brain tissue through it.

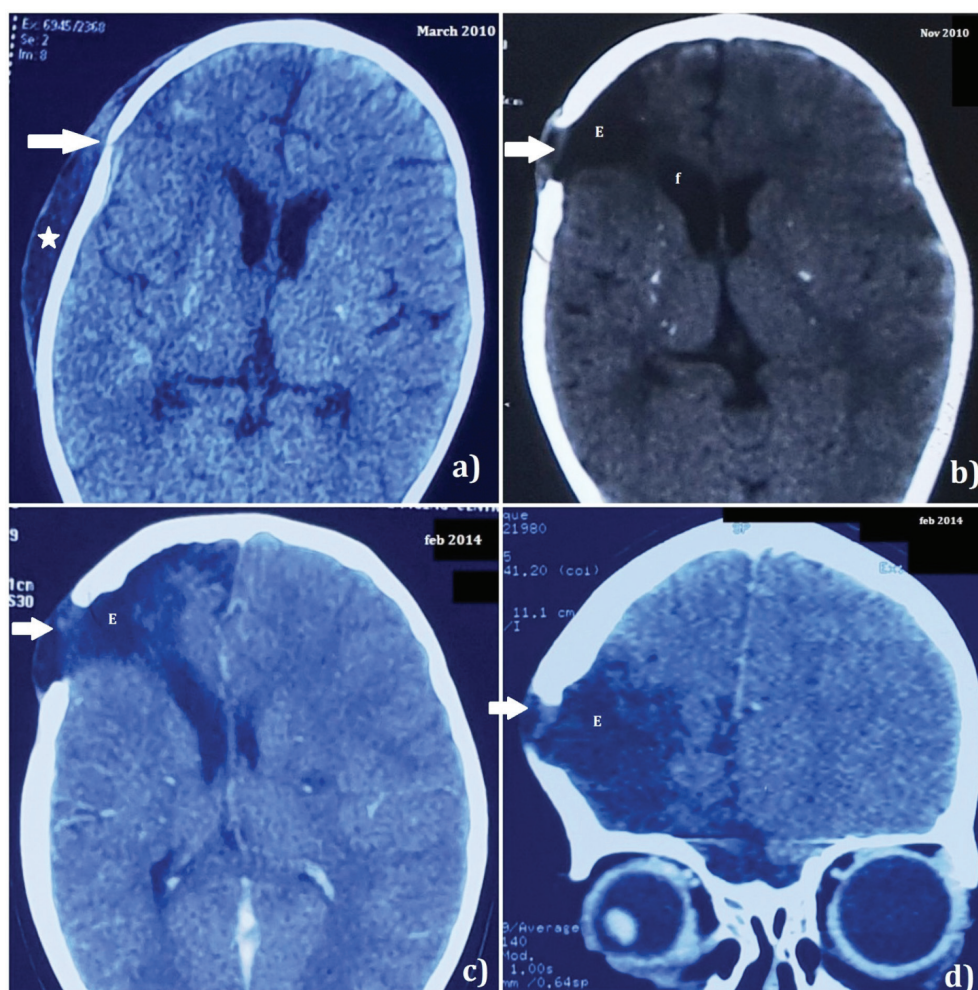
History of trauma in a paediatric patient followed by the onset of gradually progressive swelling in the scalp along with radiological findings of calvarial defect and protrusion of gliotic brain tissue through it led to the diagnosis of growing skull fracture (GSF).

GSF or craniocerebral erosion is a rare complication seen in the paediatric patients following trauma to

the head. Pathogenesis includes series of events followed by fracture of the skull causing dural laceration resulting in herniation of pia-arachnoid membranes through the torn dura. Constant cerebrospinal fluid pulsation then leads to gradual enlargement of the defect [1].

Naim-Ur-Rahman et al. [2] classified GSF into three types:

- Type I: only presence of leptomeningeal cyst in the calvarial defect.
- Type II: Presence of gliotic and encephalomalacic brain tissue in the calvarial defect.



**Figure 2.** (a) Computed tomography of the head performed at the time of trauma in axial sections showing non-displaced linear fracture line (arrow) in the calvaria in right frontal region with overlying soft tissue scalp swelling (star). Computed tomography of the head performed after 8 months (b) and after 4 years (c and d) showing gradually enlarging calvarial defect (arrow) at the site of previous fracture with protrusion of encephalomalacic and gliotic brain tissue (E) through it.

Type III: Extension of porencephalic cyst through the skull defect in the subgaleal space.

Our patient fell into the type II of GSF. Her parents were counselled about the surgical management for which they agreed. The scalp defect was repaired followed by uneventful post-operative period. She is on regular anti-epileptics for the episodes of seizures she had at the time of presentation and is on regular follow-up.

### Ethics

Ethics clearance and approval of the study were granted by the ethics committee of our institute.

Signed informed consent for participation and publication of medical details was also obtained from the parents of the patient. Confidentiality was ensured at all stages.

### Conflict of interests

The authors declare that they have no conflict of interests.

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None.

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