

# Empyema in Extradural Hematoma As a Cause of Hypodense Extradural Hematoma

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## Abstract

The causes of hypodensity in an extradural hematoma (EDH) are air, active bleeding, or chronic blood. A hypodense EDH due to secondary infection and empyema formation is not described. We describe a case of hypodense EDH due to empyema. A 24-year-old man presented 12 days after injury with headache. He was asymptomatic after injury and did not have fever. Computed tomography (CT) scan of the head revealed hypodense extradural collection in temporoparietal region with mass effect. He underwent craniotomy and evacuation of extradural lesion. The surgical findings were pus mixed with old blood. The final diagnosis was empyema within EDH.

## Keywords

- ▶ extradural hematoma
- ▶ extradural empyema
- ▶ extradural abscess

A patient may be asymptomatic after initial head injury. A few patients present later with headache and warrant investigation. Most of such patients have normal imaging findings, and symptom is ascribed to posttraumatic chronic headache. In some instances, a chronic subdural hematoma is found, particularly in elderly individuals. Rarely subacute/chronic hematoma may be seen. A chronic extradural hematoma (EDH) can also be seen in patients, days after trauma due to resolution of blood clot. However, hypodense EDH in subacute stage after trauma warrants further investigation. We describe a case of head injury that presented later, and on investigation was found to have extradural empyema within EDH.

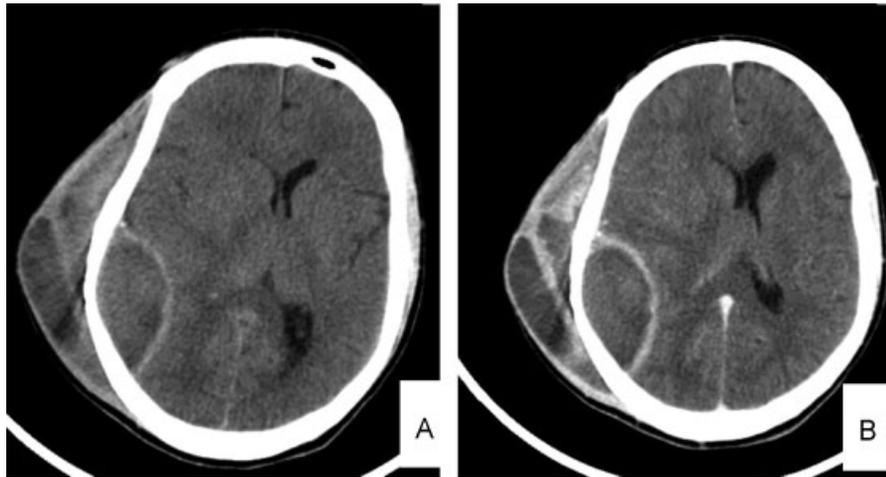
## Case

A 24-year-old man sustained head injury 12 days back. He was riding pillion, and had a fall over his head. He was unconscious for about 1 hour after injury. He had bleeding from his right ear and a scalp swelling over temporoparietal region. There was no open scalp wound. His previous medical condition was good, and he did not have any immunocompromised condition. The patient did not have history of middle ear infection. As he recovered

consciousness, he did not seek a medical consultation at that time. He was asymptomatic after injury. He presented with a history of worsening headache for past 4 days and increase in scalp swelling. On arrival at casualty, the patient was afebrile and had normal vital parameters. A boggy tender swelling was felt over his right temporoparietal scalp. He was conscious and did not have any neurologic deficits. The routine hematologic and biochemical profile was normal. A computed tomography (CT) scan of the head revealed a large biconvex hypodense lesion in extradural plane in temporoparietal region. There was hypodense scalp swelling over the same region. There was a linear fracture of temporal and parietal bone. The postcontrast study revealed peripheral rim of enhancement of extradural lesion and scalp swelling. The imaging diagnosis was extradural empyema (▶ Fig. 1). A temporoparietal craniotomy was performed. The surgical findings were pus in subgaleal and extradural plane. The pus was mixed with old EDH. Complete evacuation of pus and extradural hematoma was done. The Gram stain of pus showed gram-negative bacilli; however, the culture was sterile. A histopathologic examination of extradural tissue was not done. He was treated with injectable ceftriaxone and amikacin for

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**Fig. 1** CT scan of the head axial sections plain (A) and postcontrast (B) showing subgaleal collection and hypodense extradural collection with peripheral rim of enhancement.

4 weeks and did well. A repeat imaging after completion of medical treatment did not reveal residual pus.

## Discussion

The causes of hypodensity in an EDH are air, active bleeding, or chronic blood. Hypodense bubbles in acute extradural hematoma are described in cases of active or fresh bleeding from torn dural sinuses or transected meningeal vessels.<sup>1,2</sup> In a series of 13 cases of acute EDH as a result of injury involving the venous sinuses, 6 cases had large hypodense bubbles within the hyperdense EDH. These hypodense bubbles correlated with findings of liquid blood during surgery.<sup>1</sup> The CT scan appearance of hypodense bubbles and proximity of the clot to the venous sinuses should alert the high probabilities of venous sinus tear. The other causes of hypodensity are hyperacute lesions with ongoing active bleeding or coagulopathy.<sup>3</sup> The hyperacute EDH also shows patchy distribution of hyperdense and isodense blood similar to “swirl sign” described by Zimmerman and Bilaniuk.<sup>4</sup> Hypodensity can be due to several foci of pneumocephalus if EDH is present adjacent to fractured air sinuses.<sup>5</sup>

The unique finding in our case was hypodense EDH. Though it was after 12 days of trauma, it was too early for a hematoma to become hypodense. The other causes of hypodensity in an EDH such as air, active bleeding, or

chronic blood were not thought of; hence a contrast-enhanced CT scan was done. The contrast-enhanced CT scan was typical of extradural empyema. At surgery, it was confirmed that the patient had EDH, which got secondarily infected. Hypodensity due to pus formation within EDH is described in our case, and it should be kept in mind when evaluating a patient who presents few days after injury.

## Conflict of Interests

The authors declare that they have no conflict of interest.

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