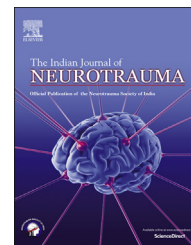


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## Case Report

# Lever technique – A new surgical technique for evacuation of extra dural haematoma in infants and children below two years



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## ABSTRACT

Craniotomy has been accepted as the treatment of choice for the management of epidural haematomas (EDH) in adults and children including infants. Some have also stressed on evacuation of EDH by multiple puncture burr hole or even single burr hole technique. It is also possible to evacuate the acute EDH by lever technique craniotomy, taking the advantage of pliability of skull of infants and children below two years, without disrupting the total bony continuity of craniotomy flap with the remaining skull bone. Two cases were managed in this technique with successful evacuation of EDH in our department. After evacuation of EDH, the patients symptomatically improved and discharged on 3rd day. Among all methods, osteoplastic flap is good as it maintains good vascularity of the flap; free flap is somehow less vascular and chance of infection is more. But, this lever technique might be one of the best technique in maintaining flap vascularity, comesis, better bone healing and again very less chance of infection.

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## 1. Introduction

Though the incidence of EDH is common in the 2nd decade of life, it is also found among children in good numbers. Among the children with EDH it is common in the age group of 6–10 yrs.<sup>1</sup> In infants it is a rare entity excluding EDH of neonates due to birth trauma.<sup>1,2</sup> Extradural haematoma is a surgical emergency in infants which needs immediate attention. The inability to express the symptoms by infants and

difficulty in clinical assessment makes it more unpredictable for neurosurgeons. The proper surgical techniques for the management of EDH is not standardised age specifically which needs more study, though the evacuation of EDH and decompression is the sole aim of surgery. The cranial vault flat bones are pliable during infancy and early childhood.<sup>3,4</sup> Cranial vault flat bones usually starts losing its plasticity after closure of fontanelles i.e. after 2 years of age.<sup>3,4</sup> In this present study, lever technique of evacuation of EDH was undertaken successfully in two children below 2 yrs, taking the

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advantage of pliability of skull bone, providing better clinical outcome, cosmesis and expecting better bone healing with less chance of infection.

## 2. Case reports

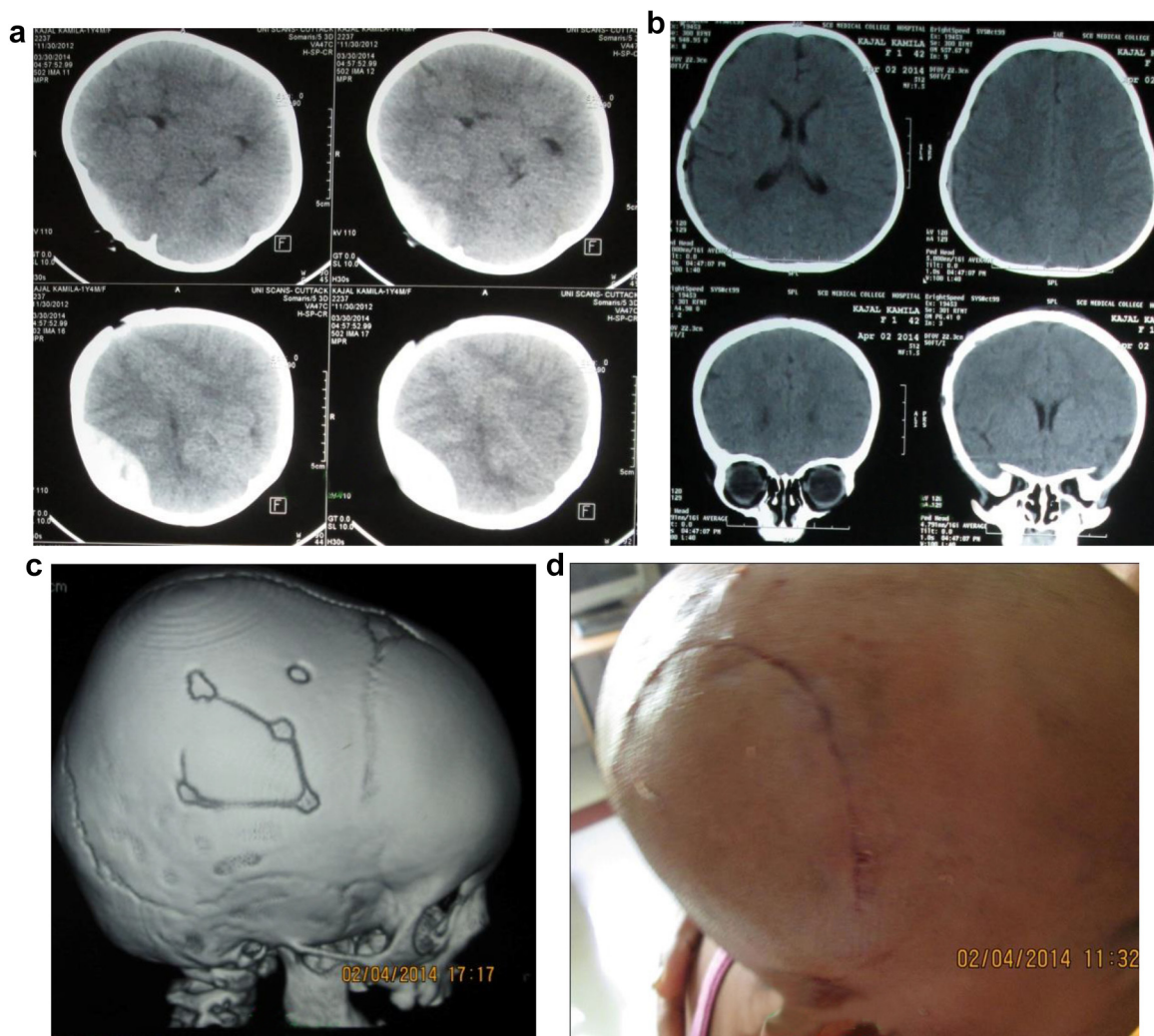
### 2.1. Case-1

An 11 month infant was admitted in the Neurosurgery trauma ward (NSTW) of our department who had sustained head injury after being hit by a cricket bat. At the time of trauma she had transient loss of consciousness and one bout of vomiting. On admission, she had pulse-70/min, BP-100/70 mm of Hg, GCS-13/15, pupil-Left-normal size and reacting to light, Right-8 mm and sluggishly reacting to light. On CT scan of brain, she had right sided temporoparietal EDH with mass effect. Immediately, she was planned for surgery by lever technique of craniotomy and evacuation. The skin was incised in a horse shoe shaped manner. Four burr holes are

made; the temporal, frontal and medial sides are cut by Gigli saw. The posterior area towards occipital area was left intact. The bone flap was then lifted about 15–20° by introducing a pericranium elevator acting as lever and the clotted EDH was evacuated from all angles with the help of Penfield dissector, suction and irrigation. The bleeding from posterior branch of middle meningeal artery was coagulated introducing bipolar cautery. Then dural hitches are given in all the three cut sides. The abgel was applied. Pericranium layer was stitched, and then wound closed in layers, skin stitched by sub-cuticular stitches with a subgaleal drain. The drain was removed on second day and patient was discharged on third postoperative day with GCS-15/15 and GOS-5/5. The post operative CT scan was done on day of discharge shows no residual EDH (Fig. 1).

### 2.2. Case-2

A 2 years male infant was admitted in the Neurosurgery trauma ward (NSTW) of our department who had sustained

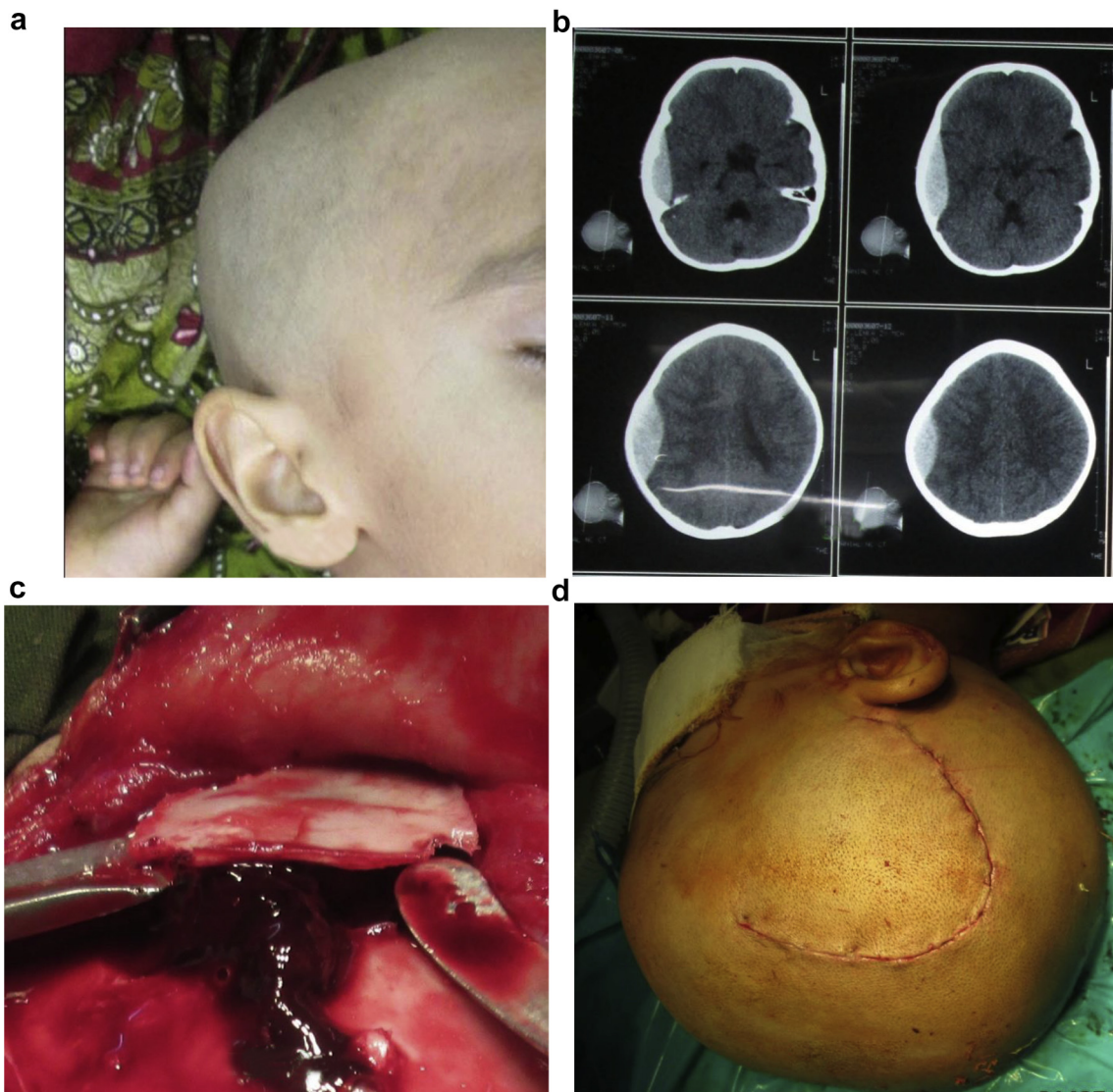


**Fig. 1 – a:** Preoperative CT scan of brain showing right temporo-parietal EDH with mass effect. **b:** Post operative CT scan of brain showing complete evacuation of EDH and better bone alignment. **c:** Postoperative three dimensional CT scan showing bony flap. **d:** Postoperative photo on 3rd day showing condition of wound.

head injury due to fall from wooden cot. At the time of trauma he had 2–3 bouts of vomiting, one episode of convulsion with no loss of consciousness. On admission his vitals were normal with GCS-15/15, pupils were bilaterally normal size and reacting to light. The CT scan of brain showed right sided temporoparietal EDH with mass effect. He was planned for operation by the same method. After temporoparietal horse shoe shaped skin flap, four burr holes were made and then the temporal, posterior parietal and medial sides were cut by Gigli saw and the anterior frontal area left as such intact. The flap was then lifted about 15–20° by introducing a pericranium elevator acting as lever and the clotted EDH was evacuated from all angles with the help of Penfield dissector, suction and irrigation. Then dural hitches were given in all the three cut sides. Pericranium layer was stitched and wound closed in layers with sub-cuticular skin stitches. The post operative period was uneventful and the patient was discharged on third day with GCS-15/15 and GOS-5/5 (Fig. 2).

### 3. Discussion

The EDH in infants is a rare entity.<sup>1,2</sup> But wide spread use of motor vehicle, house hold articles causes increase in numbers of head injury victims, though fall from height is a common cause of head injury in infants and children.<sup>1,2</sup> The principle of management in head injury patients with significant EDH is immediate evacuation and decompression. Now-a-days craniotomy with evacuation is standard for significant EDH irrespective of age of presentation.<sup>1,2</sup> In free bone flap the vascularity of flapped bone is less and more prone for infection and osteomyelitis, again fixation of bone needs plate and screws as foreign materials.<sup>5</sup> In osteoplastic bone flap, the vascularity is maintained through intact periosteum, so there is less chance of infection and osteomyelitis. But the bone is not rigidly fixed and can pulsate with brain pulsation. In infants, the periosteum is easily peeled off from the flap



**Fig. 2 – a: Preoperative patient photo. b: Preoperative CT scan of brain showing right temporoparietal EDH with mass effect. c: Intraoperative photograph showing levered flap with pericranium elevator and evacuation of EDH with Penfield dissector. d: Intraoperative skin wound after closure by sub-cuticular stitches.**

during handling and sometimes convert osteoplastic flap into free flap, which need plate and screw for fixation. Again, very thin bone of infants make them poor candidate for screw plate fixation. But in the lever technique the EDH is evacuated successfully. There is preservation of vascularity by the periosteum and bony continuity in one side. There is one side rigid natural fixation and after stitching the periosteum provides a good contour. There is no need of artificial fixation materials. The chance of infection and osteomyelitis is presumed to be low. Usually temporal sides should be included in three cut sides to recognise the bleeding from middle meningeal artery and application of hitches in that side. This lever technique is not applicable in rigid skull of children more than 2 years, adult and elderly. In single burr hole technique for EDH evacuation, it is not possible to evacuate near total clots, though it is useful in liquefied blood, again coagulation of bleeding source is more difficult.<sup>6,7</sup> Protective hitches are also not possible. Placement of intracranial epidural drain in single burrhole technique for 3 days increases chance of infection.<sup>6</sup> In multiple puncture techniques the complete removal may be possible, but is time consuming and control of bleeding source is also difficult.

#### 4. Conclusion

Evacuation of EDH can be done successfully by this lever technique taking the advantage of pliability of skull of infants and children below 2 years of age. This gives better result, easy and prompt evacuation as needed in an emergency.

#### Conflicts of interest

All authors have none to declare.

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