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Traumatic ipsilateral acute extradural and subdural hematoma. A rare but fascinating occurrence

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ABSTRACT

Occurrence of concomitant extradural hematoma (EDH) and acute subdural hematoma (SDH) after trauma on the same side is a rare occurrence. EDHs are usually coup lesions, due to direct trauma with seepage of blood from overlying skull fracture or injury to the dural arteries. Acute SDH, on the other hand, is a countercoup injury, due to brain shift causing damage to the cortical bridging veins. In all our cases, the patient presented the following impact with metal rods overhead. The impact force resulted in fracture of the bone, resulting in stripping of underlying dura, along with cortical injury eventually forming EDH and SDH. It is of importance to note the mechanism of injury and the area of major impact in these cases. Overlapping EDH and SDH shall give rise to the characteristic "CT comma sign." 3, 4 CT comma sign in our series was seen in only one case. During a retrospective analysis of the radiology of the cases, each of the hematomas had an indentation on the cortical side. These cases must undergo urgent surgery with the principal aim of evacuating extradural hematoma and then noting the status of the dura. If the dura is bulging and has a bluish tinge, then the dura must be opened and acute SDH evacuation must be undertaken. Flap must be planned keeping in mind that we may need to undertake a decompressive craniectomy and wherever possible a trauma flap must be planned.

Keywords
neurotrauma, physical assault, intracranial hematoma, skull fracture

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INTRODUCTION

Occurrence of concomitant extradural hematoma (EDH) and acute subdural hematoma (SDH) after single trauma and on the same side is a rare occurrence. EDHs are usually coup lesions and thought to be due to direct trauma with seepage of blood from overlying skull fracture or injury to the dural arteries.[1] Acute SDH, on the other hand, is a countercoup injury, due to brain shift causing damage to the cortical bridging veins.[1] It is the SDH that determines the severity of injury and outcome, due to its associated underlying brain injury.[2] As a mechanism, it is unusual to find both EDH and SDH on the same side in patients with head trauma unless there is direct trauma.[2] We present here a case series of three traumatic brain injury who presented with concomitant EDH and SDH in the same region.

Case 1

A 21 year old male presented to emergency room (ER) around 14 hour following alleged history of assault. He was hit by a metal rod over his left frontal region. He had suffered loss of consciousness and multiple episode of vomiting. There was no seizure episode or ear nose and throat bleed. At admission his GCS was E4V4M6, bilateral normal size and reacting pupils. The CT (computed tomography) scan showed left fronto parietal SDH with right temporal contusions (Fig 1). At first he was planned for conservative treatment with elective CT scan after 24 hours. Repeat scan was suggestive of increase in mid line shift and he was taken in operation for emergency decompression. Intra operatively, there was thin fracture line over temporal bone and EDH in fronto temporal region which was not evident in the pre procedural CT scan. After evacuation of EDH, the dura was assessed and there was significant bulge present. Dura was opened and underlying SDH evacuated and a proper decompressive craniectomy was undertaken. Following surgery he responded well and could be weaned off oxygen and discharged on 7th post operative day.

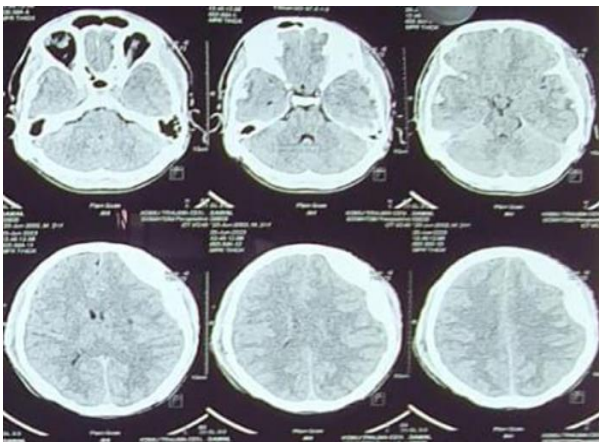

Figure 1. CT scan showing left fronto parietal SDH with right temporal contusion.

Case 2

A 50 year male presented with severe headache, multiple episodes of vomiting and altered sensorium. He had a history of physical assault around 7 days back for which he did not consult any medical practitioner. A CT brain was obtained which was suggestive of left fronto parietal acute on chronic SDH with parietal EDH (Fig 2). After raising the flap, linear temporo-parietal bone fracture was seen and underlying EDH was evacuated. After evacuation of EDH, there was bluish tinge over dura and dura was opened and concomitant SDH evacuated. In this case a large trauma flap was raised in anticipation of brain bulge and need for decompressive craniectomy. After evacuation of SDH there was bulge and decompressive craniectomy was undertaken. He was operated at a GCS of E2V2M5 and was discharge on 9th post op day at a GCS of E4V4M6.

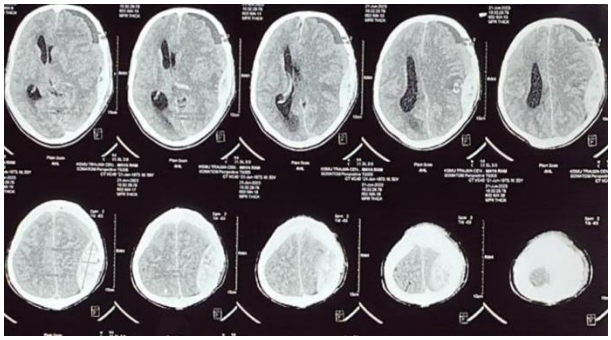

Figure 2. CT scan showing left hemispheric acute on chronic SDH with parietal EDH.

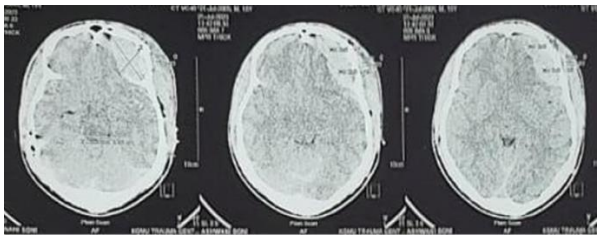

Figure 3. Left frontal EDH with underlying frontal hematoma.

Case 3

A 35 year old male was admitted in neurosurgery ward after 6 hour following alleged history of assault with iron rod. He was hemodynamically stable with a GCS E4V2M5 with bilaterally reacting pupils and mild paucity of movement on right side. CT scan of brain was suggestive of frontal EDH with underlying right frontal hematoma (Fig 3). Patient was taken to surgery after relevant pre anesthetic check up; right frontal flap raised. there was underlying linear frontal and temporal bone fracture. After evacuation of EDH, dura was tensed. A dural nick was given using tenotomy scisoors which reveled underlying SDH. Frontal flap was revised to trauma flap and a fronto temporo parietal decompressive craniectomy was done with evacuation of SDH. After proper hemostasis, augmentation duraplasty was done and

patient was ventilated electively for 12 hours, He had an uneventful post operative period and was discharged on 6th post operative day.

Discussion

Following traumatic brain injury, EDH and SDH appear in opposite locations as EDH is a coup injury and SDH is a contrecoup injury. The mechanism of formation of traumatic EDH and SDH are entirely different. EDH, mostly located in the temporo-parietal region is due to tear of anterior or posterior divisions of the middle meningeal arteries, rarely vein and dural venous sinus, with an associated linear vault fracture.[2] Acute SDH on the other hand is mostly due to bleeding from contused cortex, torn bridging veins, or torn cortical blood vessel.[2] In all our cases, the patient presented following impact with metal rods over head.

The impact force resulted in fracture of the bone, resulting in stripping of underlying dura, along with cortical injury eventually forming EDH and SDH. It is of importance to note the mechanism of injury, and the area of major impact in these cases. Our series had all cases being of physical assault, thus making such mode of injury a etiology for such concomitant presentation.

Following trauma to brain CT scan is the investigation of choice both as the initial modality of imaging as well as for follow-up imaging.[3] Overlapping EDH and SDH shall give rise to characteristic "CT comma sign." [3, 4] CT comma sign in our series was seen in only one case. Moreover, CT comma sign will be more appreciable when the underlying SDH is hemispheric. On retrospective analysis of the radiology of the cases, each of the hematoma had an indentation in the cortical side. (Figure 4) This can explained by the fact that the biconvex EDH and underlying biconcave SDH, both being hyperdense gives this peculiar appearance. Although, whether such appearances are always related to concomitant presentation or not couldn't be stated at present.

The outcome of head injury is mostly determined by the neurologic status of the patient, severity of brain injury, and time interval from injury to neurosurgical intervention. [5, 6] Surgical evacuation of the traumatic EDH is one of the most 'cost effective' of all surgical procedures in terms of quality of life and years preserved.[2] In our cases, 2 patients presented within a day of injury, and one presented almost a week after injury. All three underwent intervention on emergency basis. The presenting GCS was comparatively good and we can attribute the post operative outcome to this factor more than the time of presentation.

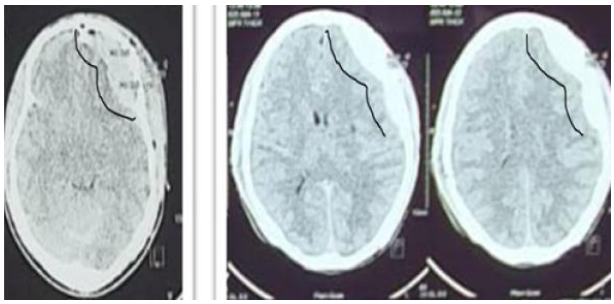

Figure 4. Indentation in the cortical surface of the hematoma

Conclusions

When EDH and SDH happens in the same side, the cause of the EDH is direct injury of dural artery or seepage from fracture and the SDH is due to injury of cortical artery and/ or vein. We conclude that we must be more vigilant when we approach a case of physical assault, as these cases seemingly have more chances of such occurrences. Next, we should be more vigilant while reading the scans. The presence of an indentation in the cortical border of the hematoma should raise the suspicion of an underlying SDH. In some cases CT comma sign is seen with ease and in those cases surgery must be planned accordingly to evacuate both the components. These cases must undergo urgent surgery with the principle aim to evacuate extradural hematoma and then note the status of the dura. If the dura is bulging, having a bluish tinge, then dura must be opened and acute SDH evacuation must be undertaken. Flap must be planned keeping in mind that we may need to undertake a decompressive craniectomy and wherever possible a trauma flap must be planned.

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