

# Vertex Epidural Hematoma with Bilateral Abducent Nerve Palsy: Case Report and Literature Review

## *Bilateral Abdusent Sinir Paralizisi ile Birlikte Görülen Vertekse Yerleşmiş Epidural Hematom: Olgu Sunumu ve Literatürün Gözden Geçirilmesi*

Khursheed NAYIL, Masood LAHARWAL, Anil DHAR, Abrar WANI, Altaf RAMZAN, Sajad ARIF

*Sher-i-Kashmir Institute of Medical Sciences, Department of Neurosurgery, Kashmir, India*

Correspondence address: Khursheed NAYIL / E-mail: nkhusrh@rediffmail.com

### ABSTRACT

Epidural hematomas which are located at the vertex are rarely seen and form a small percentage of total epidural hematomas. Tearing in the superior sagittal sinus is the usual cause of an epidural hematoma located in the vertex. The clinical features of this entity are non-specific; hence, localization of the lesion is difficult. We report an adult who was hit by a motorcycle and was initially discharged from the hospital as a case of concussion head injury. He returned back with raised intracranial pressure symptoms, so a CT scan was done but was misinterpreted, and he reported one week later with bilateral abducent nerve palsy. Magnetic resonance imaging confirmed vertex EDH for which he was operated. These hematomas are seen rarely and can be interpreted as an artifact. Its recognition is important because it has an excellent prognosis. We concluded that all head injury patients should get high axial cuts on the CT scan, and any degree of suspicion should prompt a neurosurgeon to investigate further with coronal CT scan or MRI.

**KEYWORDS:** Extradural hematoma, Vertex, Abducent nerve palsy

### ÖZ

Vertekse yerleşmiş epidural hematomlar nadir görülürler ve tüm epidural hematomlar içinde küçük bir yüzde olarak bulunur. Bu hematomlara süperior sagittal sinüsteki bir yırtık yol açar. Bu hematomların spesifik klinik bulguları olmadığından kafa içindeki yerini belirlemek çoğunlukla mümkün olmaz. Yaya halde iken motosiklet tarafından çarpılan hastaya serebral kontüzyon tanısı konulmuş ve taburcu edildi, hasta tekrar hastaneye kafa içi basınç artışı bulguları ile getirildi ancak çekilen beyin bilgisayarlı tomografisinde patoloji yok denilerek hasta tekrar taburcu edildi. Hasta bir hafta sonra bu kez iki taraflı abducent paralizisi ile hastaneye müracat etti ve yapılan kranial manyetik rezonans görüntülemesinde vertekste epidural hematom saptanan hasta ameliyat edildi. Vertekse yerleşmiş epidural hematomlar bilgisayarlı tomografide artefakt olarak değerlendirilerek kolayca atlanabilir; bunun yanı sıra bu patoloji oldukça nadir görülür ve tanındığı zaman gerekli tedavi ile hastaların prognozu mükemmel yakındır. Kafa travması ile gelen hastaların özellikle vertikal bölgesi bilgisayarlı tomografi ile iyi taranmalı, şüphe durumunda koronal kesitler alınmalı, yine şüphe varsa hastalara kranial manyetik rezonans görüntülemesi yapılmalıdır.

**ANAHTAR SÖZCÜKLER:** Ekstradural hematom, Verteks, Abdusent siniri paralizisi

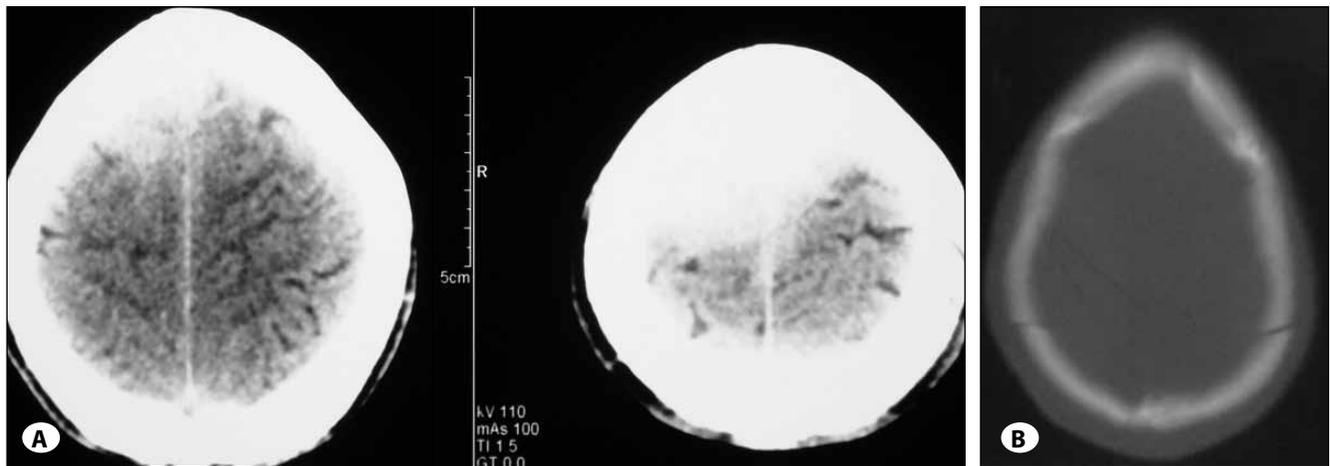
### INTRODUCTION

Vertex epidural hematomas constitute a small percentage of total epidural hematomas (11). The usual cause of a hematoma is a tear in the sagittal sinus (2). High axial cuts on CT scan can diagnose this entity; however care has to be taken not to mistake it for an artifact (16). MRI is a better modality and can confirm the diagnosis (18). Depending upon the size of the hematoma and the symptoms, the lesion can be managed conservatively or surgically (15,21).

### CASE REPORT

A 27-year-old male was allegedly hit by a motorcycle. He had transient loss of consciousness at that time. He was shifted to a local hospital where on examination he was found to be conscious, alert and ambulant. There was no evidence of external injury. He was prescribed some analgesics and was

discharged. He reported back next day to the same hospital with headache and vomiting. A CT scan head was done revealing hyperdensity in midline high axial cuts, which was thought to be an artifact (Figure 1A). CT scan bone windows showed a linear fracture involving both parietal bones (Figure 1B). He was again prescribed analgesics and was discharged. Six days later he reported to our Neurosurgical out-patient department with history of diplopia. On examination, he was conscious, alert, and ambulant. Pupils were equal and reacting to light. Fundi revealed bilateral papilledema. He had bilateral 6th nerve palsy, more pronounced on left side (Figure 2). There were no motor or sensory deficits. Plantar reflexes were normal. CT scan was reviewed and the artifact was thought to be a vertex epidural hematoma. To confirm it, MRI brain was done, which revealed a biconvex collection of blood at the vertex with mass effect, suggestive of a vertex EDH (Figure 3A-C). The patient underwent a vertex craniotomy



**Figure 1:** A) CT scan head showing hyperdensity in high axial cuts. B) CT scan (bone windows) showing the linear fracture involving both parietal bones.



**Figure 2:** Clinical photograph showing the patient with bilateral abducent nerve palsy, more pronounced on the left side.

with evacuation of EDH. At surgery a non-depressed fracture was found running across both parietal bones. There was no evidence of a sinus tear or active bleed. About 50-60 ml blood was found around the superior sagittal sinus region which was evacuated. The bone flap was put back and the wound was closed in layers. The postoperative period was uneventful and his diplopia recovered fully within 3 weeks of surgery.

### DISCUSSION

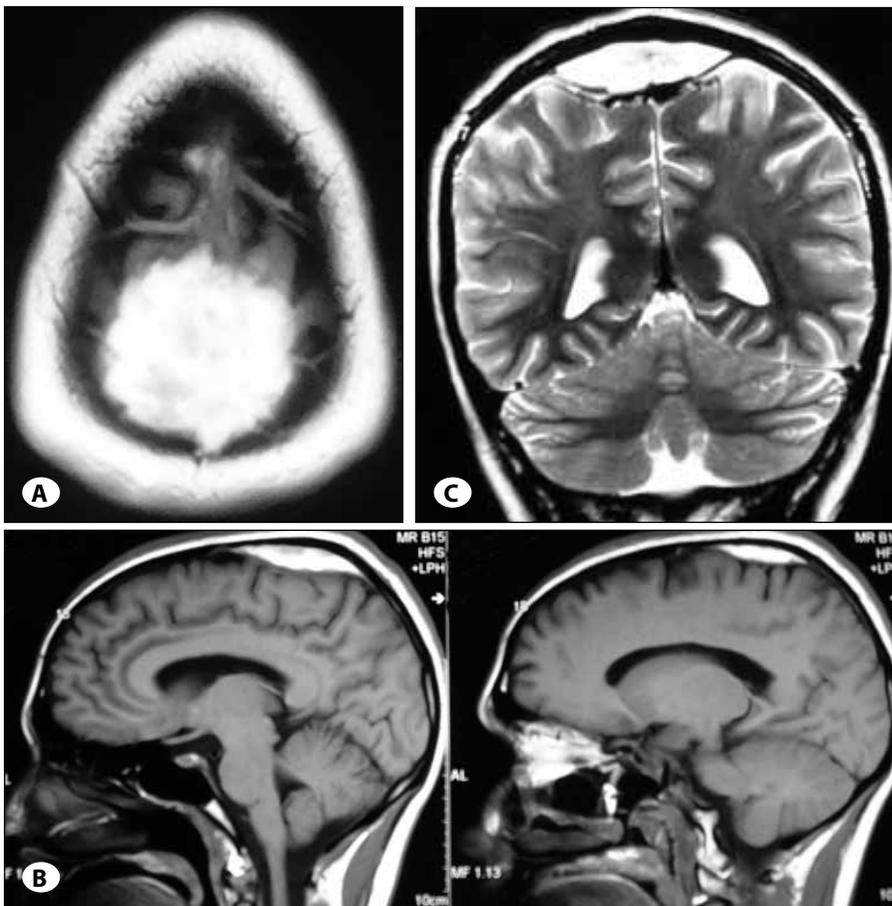
Vertex epidural hematomas constitute 1% to 8% of total epidural hematomas (11,15). The first case of vertex EDH was reported by Guthrie in 1862 in a soldier who fell off his horse (12). In a series of 167 cases of extradural hematomas, Gallagher JP et al. reported vertex EDH in only one patient (10). The largest series of 14 cases of vertex EDH has been reported by Borzone et al. in a 12 year study (3). The cause of bleeding is either a tear in the sagittal sinus, or the fracture line itself or the dural stripping from the inner table (8). Spontaneous vertex EDH has also been reported (9).

There are several non-specific clinical features and hence localization of the lesion becomes clinically difficult (9,21). The presentation of vertex EDH can be acute (3) or chronic (1,17,22). Acute presentation usually occurs if there is a large tear in the superior sagittal sinus and mortality in such cases is very high (8).

The commonest symptom is worsening headache and vomiting (3, 4, 11). Stevenson et al. reported unilateral 6th cranial nerve palsy in their patient (22). Papilledema has been noted in most of the reported cases (4). We noticed bilateral abducent nerve palsy with papilledema in our patient. Increased intracranial pressure was most possibly the mechanism for both bilateral abducent nerve palsy and papilledema. The mechanism of raised ICP is thought to be obstruction of the superior sagittal sinus and its draining veins (5). Increased ICP leads to downward displacement of the brain which causes stretching of the abducent nerves against the petrous ridge especially near the Dorellos canal and hence giving rise to abducent nerve palsy (23). Papilledema has been noticed to occur from few hours of injury to few weeks (5,22). The limb weakness surprisingly has not been reported solely in the lower limbs as one would expect, keeping in mind the proximity of the leg area of the cerebral cortex which gets compressed by the clot. The upper and lower limbs get affected equally (1,7).

A radiograph may reveal a non-depressed fracture of the skull crossing the sagittal suture or there may be sutural diastasis of the sagittal suture (22). However there are cases where fracture has not been seen on radiograph or at surgery (8). In our patient there was a linear fracture in both the parietal bones. Misinterpreting vertex EDH as an artifact is not rare (6,18,21). CT scan can easily miss a vertex EDH unless high axial cuts have been taken. The partial volume effect makes differentiating vertex blood difficult from bone and coronal CT scan is a better method of investigation (11). Any doubts on axial CT scan should therefore prompt a neurosurgeon to do a coronal CT scan or MRI brain. MRI brain because of its multiplanar imaging can clearly delineate the hematoma (18, 20). The first case in the literature in which MRI was used to diagnose a vertex EDH was reported by Ramesh in 1995 (18).

The course of management of vertex EDH is both conservative (6,11,14,16) and surgical (13,18,24). The factors which decide the type of management are clinical symptoms and signs, the



**Figure 3:** MRI brain T1-weighted images reveal hyperintense blood clot in high axial sections (A), sagittal sections also reveal a biconvex collection at the vertex (B), coronal images reveal the displacement of sagittal sinus inferiorly by the clot (C).

clot volume, amount of displacement and distortion of the sagittal sinus, and its mass effect on brain.

Unlike EDH at other locations in the supratentorial area, a small volume at the vertex may need surgery as the pathophysiology is entirely different (21). At the same time, an asymptomatic small hematoma does not need surgery. During surgery, the tears in the sagittal sinus may get exposed and may lead to significant blood loss and even lead to air embolism (8). In our patient there was no tear in the sagittal sinus however we noticed a shift of the hematoma posteriorly when we compared the CT findings with the MRI and operative findings. The hematoma on CT scan was located anterior to the coronal suture and MRI done 6 days later showed the hematoma straddling across the coronal suture. This finding was confirmed intraoperatively also. This could be because of the effect of the gravity on the blood clot in the lying down position over one week.

### CONCLUSION

Any degree of suspicion on high axial cuts on CT scan should prompt a neurosurgeon to investigate further with coronal CT scan or MRI.

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