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Diastasis coronal suture fracture with frontoparietal (vertex) epidural hematoma in adult. A rare case

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ABSTRACT

Introduction: Vertex epidural hematoma (VEDH) is an uncommon presentation of extra-axial hematomas and comprises 1-8% of all extradural hematomas. It can represent a surgical dilemma regarding when and how to operate, particularly considering the potential implication of the superior sagittal sinus (SSS). It is estimated that up to 85%-95% of EDHs are associated with skull fractures. Nonetheless, diastasis of cranial sutures in adults has scarce scientific reports, let alone with associated epidural hematoma.

Cases: We reported a 42-year-old male patient who came with a main complaint of a lacerated wound on his head due to an accident when he repaired the truck tire. His GCS score was 15 without any neurological deficit. A Head CT scan revealed a hyperdense biconvex lesion on the frontoparietal (vertex), frontal sinus depressed fracture and diastasis fracture of the coronal suture. Craniotomy evacuated EDH and craniectomy elevated depressed fracture with cranialization of frontal sinus were performed. Postoperative there is no surgery complication.

Discussion: Vertex epidural hematoma (VEDH) frequently causes a diagnostic dilemma, both clinically and radiographically. Clinically, VEDH are often indicated by elevated intracranial pressure (a headache which is usually severe and unrelenting, nausea, visual impairment, and vomiting). Those resulted from compression of the venous outflow at the SSS and subsequently decreased absorption and outflow of cerebrospinal fluid (CSF), which may not contribute to the establishment of a specific diagnosis. Vertex fractures are present in most cases with a linear fracture line crosses (usually horizontally) the sagittal suture overlying the hematoma or diastasis of the coronal and/or sagittal suture, with or without significant external sub-galeal hematomas, indicating a vertex impact.

Conclusion: Vertex epidural hematoma is a rare case. In this case, the patient had GCS score 15 without any neurological deficit. The prompt decision to surgery is vital for good outcomes for the patient with VEDH.

INTRODUCTION

Vertex epidural hematoma (VEDH) is a relatively uncommon type of posttraumatic intracranial hematoma; constituting roughly 2.5% of all epidural hematomas, and it has certain features which are distinct from EDH at other sites.^{1, 2} It is recognized as a separate entity, which has

Keywords
craniotomy,
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both diagnostic and therapeutic challenges due to its unique pathogenesis and location.

VEDH may be missed in the routine axial computerized tomography (CT) scan because of its location, and bleeding usually derives from the superior sagittal sinus, and its presentation is more often acute than chronic.^{1, 2} Fractures are often found, but diastasis of the sagittal suture in adults is quite unique.

CASE REPORT

We report a 42 year-old male patient that came to the ER with the chief complaint of lacerated wound on his head due to an accident that happened when he was repairing his truck tire. On admission, his GCS score was 15, and no neurological deficit was found. CT scan of the head revealed a hyperdense biconvex lesion on the fronto-parietal (vertex), frontal sinus depressed fracture and diastasis with depressed fracture of coronal suture.



Figure 1. Clinical Presentation in the ER.



Figure 2. Schedel X-ray.

We performed craniotomy, EDH evacuationis done and craniectomy elevated depressed fracture with cranialization of frontal sinus. EDH with approximately 50 mL in volume evacuated using

controlled suction and irrigation; fracture fragments were removed by bone rongeur and venous bleeding from the fracture was controlled with bone wax.

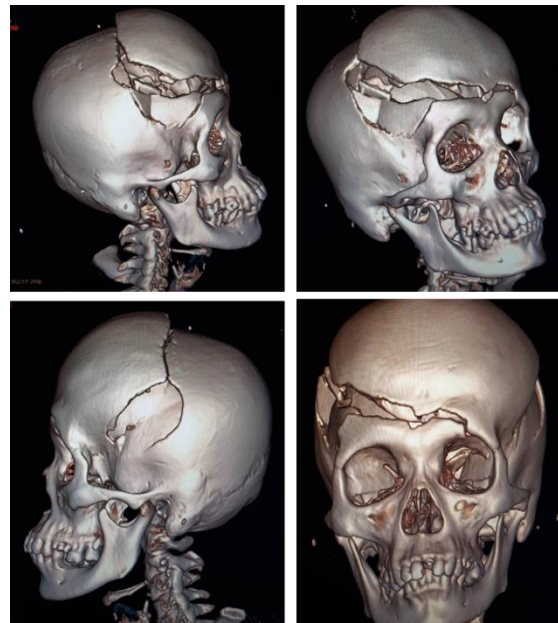


Figure 3. 3D reconstruction.



Figure 4. Intraoperative picture of the VEDH,

Following the surgery, the patient returned to the intensive care unit (ICU). He was extubated approximately 48 hours postoperatively; and by day 5 he has GCS of 15 and no neurological deficit was found. He was discharged on the 7th day.

At the time of 1 month follow-up, we performed non-contrast head CT and described cranial defect of right and left frontoparietal bone.

DISCUSSION

Epidural hematoma (EDH) is a common traumatic sequel, and it is estimated that up to 85-95% of EDHs are associated with skull fracture.² On the other hand, vertex epidural hematoma (VEDH) is a

relatively uncommon type of posttraumatic intracranial hematoma, and it has several unique features that render it a separate entity.^{1,2} It occurs in the quadrangular area of the skull, bounded anteriorly by bregma and coronal sutures; posteriorly by lambda and lambdoid suture; laterally by the parietal eminence.¹ The source of epidural hematoma are any of the following: 1) a tear in the sagittal sinus, which is the most common source, 2) bleeding from the skull fracture line itself, 3) dural stripping from the inner table of the skull, 4) bleeding from the diseased vascular skull bone, 5) arteriovenous fistula of meningeal artery created by a laceration of dura underlying a linear skull fracture.^{1,3,4}

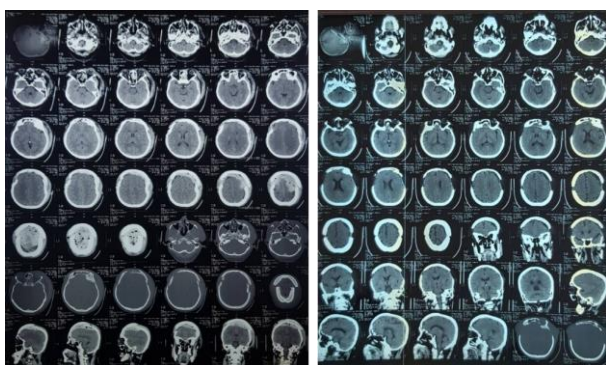


Figure 5. Pre (left) and postoperative (right) CT scans; note the hyperdense biconvex lesion on the vertex seen on preoperative CT.



Figure 6. Clinical presentation at 1 month follow-up.

VEDH is a rare type of posttraumatic intracranial hematoma; in a report by Wylen and Nanda, they reported that VEDH account for 1.3 to 8.2% of all traumatic intracranial hematomas, while vertex intracranial epidural hematoma (VEH) account 8% of all epidural hematomas.^{5,6}

The clinical manifestations of VEDH is highly variable; they may present either in the immediate posttraumatic period, or later. Borzone et al reported that 9 out of 14 patients presented in the

acute phase, while Ramesh et al presented that 22 out of 29 patients presented within the first 24 hours with severe headache.^{1, 7} Severe headache is considered to be major symptom of VEDH, and there seems to be a pattern where this headache gradually increases in its intensity, from mild to severe.^{2, 3, 8} Headache was the presenting symptom in all cases; papilledema was present in five patients and lower limb weakness in five patients. None of them had any cranial nerve involvement.¹

The pathogenesis of headache in these cases could be either due to dural irritation around the SSS, which is rich in pain sensitive fibers; this meningeal layer has sensory innervation from trigeminal nerve; or raised intracranial pressure (ICP) due to obstruction of SSS; while the progressive intensity of this headache is thought to be due to the gradual detachment of the dura mater covering the SSS.²

Some other patients may present with other features of increased ICP; a headache which is usually severe and unrelenting, nausea, visual impairment, and vomiting.^{3, 8} Those were results from compression of the venous outflow at the SSS and subsequently decreased absorption and outflow of cerebrospinal fluid (CSF), which may not contribute to the establishment of a specific diagnosis.

Other presenting feature of VEDH may include lower limb weakness, either unilateral or bilateral; while some other may also have upper-limb weakness or hemiparesis.^{5,9,10} This is because of the pressure given directly to the motor cortex representing the leg area. The presence of pure motor weakness without sensory involvement should alert the attending physician to the possibility of the intracranial cause of the weakness.¹ Another possibility of VEDH feature is cranial nerve involvement, which is quite unusual in VEDH, but there has been a report of VEDH presenting with unilateral third nerve palsy.⁹

Acute VEDH might go overlooked on classic CT scans, due to the blind spot near the top of the calvaria, because fresh blood of acute VEDH is isodense with the nearby bone of the upwardly coning skull and might somehow overlap with it, unless coronal and sagittal reconstructions are made from the axial scans.² This, unfortunately, requires studies with thin slices; otherwise the reconstruction will have somewhat poor quality. Even if noticed, the fresh blood might be mistaken for hyperostosis,

meningioma, dural lymphoma, or plasmocytoma.² In routine axial CT scan, VEDH may be seen as 1) vague hyperdense lesion in the highest slices, which often be dismissed as an artifact; 2) fracture line is running across the vault of the skull on either side; 3) diastasis of coronal or sagittal suture; this findings can be confirmed with directional coronal CT.¹

MRI scans are very useful in diagnosing VEDH, due to its multi-planar capabilities and lack of bone artifacts; however it is not used routinely because of the longer time taken and it costs a lot, even though it has its own advantages; for example in the bone window view it may unveil a fracture line and contrast-enhanced MRI may help the preoperative planning with detailed assessment of the relations with adjacent structures; yet, directional coronal CT is still the preferred radiological investigation in suspected cases of VEDH.¹ Recognizing the cranial sutural diastasis is also not easy. To date, there is no study providing normal limits of width of adult cranial sutures.²

The management of VEDH is better considered on a case to case basis.¹ Factors which determine the management of VEDH are 1) the size of the VEDH, 2) the rapidity of evolution of the VEDH, 3) the location of the hematoma, and 4) the clinical presentation of the patient.¹ Smaller hematomas are likely to resolve spontaneously, while rapidly evolving hematomas often than not are fatal; hence the need for immediate evacuation.

VEDH in the posterior is often more severe in symptoms and usually it require surgical evacuation. Common indications for immediate VEDH evacuation surgery are 1) deteriorating consciousness, 2) features of severely increased ICP, 3) features of focal neurological deficit, and 4) hematoma measuring more than 30 mL in volume.^{1,11} This surgical management include wide craniotomy, extending across the midline to include the margins of the hematoma, evacuation of the hematoma, and controlling the source of the bleeding.

High suspicion, right diagnosis, close monitoring, and surgical intervention when required lead to a good outcome in VEDH.¹ The following should make one suspect the presence of VEDH: 1) direct impact on the vertex, 2) fracture line running across the vertex, 3) coronal or sagittal suture diastasis, 4) the patient presenting with features of increased ICP and or limb weakness.¹

CONCLUSION

VEDH is a relatively uncommon type of posttraumatic intracranial hematoma, accounted for 1.3 to 8.2% of all traumatic intracranial hematomas.^{1, 2, 5, 6} The clinical manifestations of VEDH is highly variable; they may present either in the immediate posttraumatic period, or later, with severe headache is considered to be major symptom of VEDH, and there seems to be a pattern where this headache gradually increases in its intensity, from mild to severe, caused by elevated ICP, therefore, clinical presentation of VEDH can be signs of elevated intracranial pressure.^{2, 3, 8}

Acute VEDH might go overlooked on classic axial CT scan due to the blind spot, hence directional coronal CT and MRI are the preferred radiological investigation in suspected cases of VEDH.¹

The management of VEDH is better considered on a case to case basis.¹ High suspicion, right diagnosis, close monitoring, and surgical intervention when required lead to a good outcome in VEDH.¹ The following should make one suspect the presence of VEDH: 1) direct impact on the vertex, 2) fracture line running across the vertex, 3) coronal or sagittal suture diastasis, 4) the patient presenting with features of increased ICP and or limb weakness.¹

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