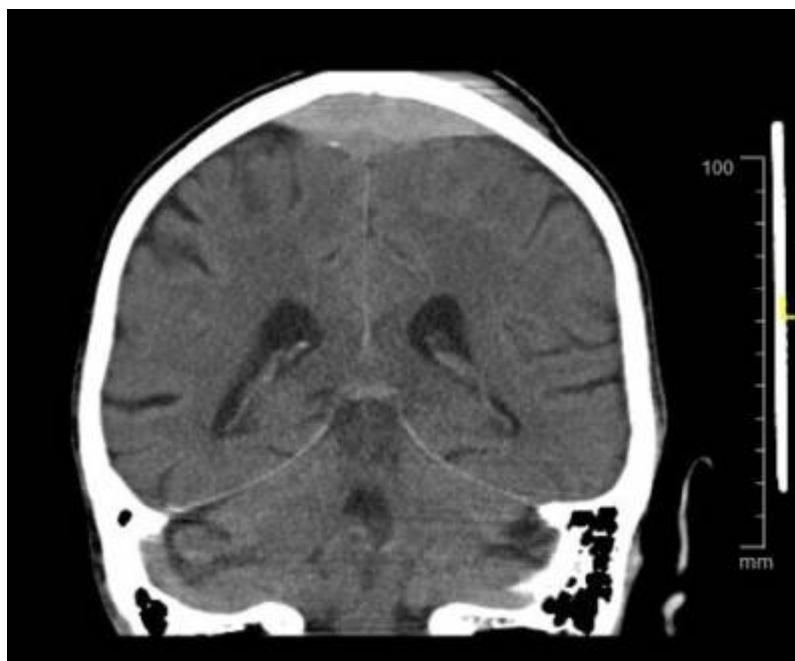


# Vertex epidural hematoma



Vertex epidural hematomas occur 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.

## Etiology

The source of this epidural hematoma are any of the following:

- (1) A tear in the sagittal sinus, which is the commonest source <sup>1)</sup>.
- (2) Bleeding from the skull fracture line itself <sup>2)</sup>.
- (3) Dural stripping from the inner table of the skull <sup>3)</sup>.
- (4) Bleeding from the diseased vascular skull bone, as in Paget's disease <sup>4)</sup>.
- (5) Arteriovenous fistula of meningeal artery created by a laceration of dura underlying a linear skull fracture <sup>5)</sup>.

## Epidemiology

Wylen and Nanda reported that VEDH account for 1.3-8.2% of all traumatic intracranial hematomas <sup>6)</sup>.

Vertex intracranial epidural hematomas (VEH) account for only 8% of all epidural hematomas. However, these traumatic injuries may be underestimated or overlooked altogether when only computed tomography (CT) scans are used for diagnosis. The vertex may be a potential anatomic "blind spot" on this radiological method. In such cases, magnetic resonance (MRI) offers a great

diagnostic aid <sup>7) 8)</sup>.

## Clinical features

The clinical presentation of VEDH is variable. They might present either in the immediate posttraumatic period or later. In the series of Borzone et al., 9 out of 14 patients presented in the acute phase <sup>9)</sup>.

In the series of Ramesh et al., 22 out of 29 patients presented within the first 24 h with severe headache. Headache was the presenting symptom in all the cases. Papilledema was present in five patients and lower limb weakness in five patients. None of the patients had any cranial nerve involvement. <sup>10)</sup>.

Severe headache is considered to be a major symptom of VEDH. This has been emphasized by Columella et al. <sup>11)</sup> and by Miller et al. <sup>12)</sup>.

The pathogenesis of the headache in these cases could be either due to direct dural irritation around the SSS, which is rich in pain sensitive fibers or raised intracranial pressure (ICP) due to obstruction of SSS. Some patients may present with other features of increased ICP (visual impairment and papilledema) <sup>13) 14)</sup>.

Lower limb weakness, either unilateral or bilateral, is also a presenting feature of VEDH. This is because of the direct pressure of VEDH on the motor cortex representing the leg area. Paraparesis may mislead the attending physician into suspecting a spinal cord injury <sup>15) 16) 17)</sup>.

Some patients also have upper-limb weakness or hemiparesis <sup>18) 19)</sup>.

Cranial nerve involvement is unusual in VEDH. Alexander has reported a case of VEDH presenting with unilateral third-nerve palsy <sup>20)</sup>.

## Diagnosis

Demonstration of VEDH in the pre-CT era had been by venous phase of angiography, which showed an avascular area separating SSS from the inner table of the skull and narrowing of the SSS <sup>21) 22)</sup>.

With the advent of multi-planar imaging modalities like CT and MRI, the diagnosis of VEDH has become much easier. In routine axial CT scan, done in cases of head trauma, VEDH is missed many of a time. In the axial CT scan, VEDH may be seen as:

- (1) Vague hyper-dense lesion in highest slices, which might be dismissed as an artifact <sup>23) 24)</sup>.
- (2) Fracture line is running across the vault of the skull on either side.
- (3) Diastasis of coronal or sagittal suture. In these cases, the diagnosis can be confirmed with direct coronal CT.

Ramesh and Sivakumar reported the first case of VEDH diagnosed with MRI <sup>25)</sup>.

MRI scans are very useful in diagnosing VEDH, due to multi-planar capability and lack of bone artifacts <sup>26) 27) 28)</sup>. However, the MRI is not used routinely because of the longer time taken and higher cost.

Direct coronal CT is the preferred radiological investigation in suspected cases of VEDH.

## Treatment

The management of VEDH is better considered on a case to case basis <sup>29) 30)</sup>

## Case series

The majority of the cases reported so far have been either isolated case reports or small series. Columella et al. reported the first series in an Italian language journal <sup>31)</sup>.

Alexander reported the first major series in English language literature <sup>32)</sup>.

### 2017

Twenty nine cases of VEDH encountered over a period of 17 years have been analyzed, including 26 males and 3 females. Majority were due to road accidents. Headache, papilledema and lower limb weakness have been the major presenting features in these cases. The diagnosis was by direct coronal computerized tomography (CT) scan in most of them. Majority were managed conservatively with observation and serial imaging. Four patients who had large VEDH with altered sensorium were managed surgically. The source of bleeding was mainly from superior sagittal sinus.

VEDH has to be suspected when a patient presents with impact over the vertex and features of raised intracranial pressure. Direct coronal CT or magnetic resonance imaging is useful in the diagnosis. Surgery is required when the patient develops progressive deterioration in sensorium and/or with the hematoma volume more than 30 ml. The present series of 29 cases is the largest reported so far <sup>33)</sup>.

### 2000

The neuroradiologic studies of four patients (CT in four, MR imaging and MR venography in one) were evaluated for EDH shape, size and appearance.

EDHs were biconvex in three patients and crescentic in one patient. CT appearances included a collection that was hyperdense (two patients), generally isodense with a few regions of hyperdensity (one patient) and mixed hyperdense and hypodense (one patient). MR imaging findings in one patient consisted of hyperintense signal on T1-weighted images and hypointense signal on T2-weighted images. Inferior displacement of the superior sagittal sinus was seen in two patients. Diagnosis of a small vertex EDH was difficult on routine axial CT in one patient, but apparent on MR imaging and MR venography.

Small vertex EDHs can be difficult to diagnose on routine CT. MR imaging or thin section CT should be performed to exclude the diagnosis in patients with trauma to the skull vertex <sup>34)</sup>.

## Case reports

### 2017

A 60-year-old man sustained a ground-level fall resulting in complete diastasis of the sagittal suture with underlying large VEH causing significant mass effect on the SSS and bihemispheric convexities. Twenty-four hours later, the patient deteriorated, with decreased level of alertness and worsening asymmetric paresis on his lower extremities. He subsequently underwent surgical evacuation of the hematoma, decompression of the SSS, and fracture repair. A modified bicoronal approach, with bilateral parasagittal craniotomies, was performed. A central island of bone was left intact to spare the diastatic fracture from the craniotomies. This was done to ensure a stable anchor point for tacking-up the underlying displaced dura and SSS. The central bone prevents extensive bleeding from the diastatic fracture and eliminates the risk of further blood reaccumulation and tearing of a possible injured sinus during bone flap elevation.

The technique performed allowed to evacuate completely the hematoma while preserving the SSS and repairing the sagittal suture to avoid further bleeding. Complete neurologic recovery of the patient occurred after VEH evacuation. Because of its rare nature, VEH represents a surgical challenge. Because neurosurgeons encounter this condition relatively infrequently, literature regarding the medical and surgical management of this entity is warranted <sup>35)</sup>.

### 2016

Navarro et al. reports a head trauma who developed progressive and intractable headache. MRI made the diagnosis of progressive VEH and highlighted the detachment of the [superior sagittal sinus](#) by the hematoma. Surgical treatment, because of the refractory clinical findings, was performed with good postoperative recovery.

Multiple trauma patients with progressive and refractory headache should have their head CT thoroughly reviewed and, if necessary, be investigated with MRI <sup>36)</sup>.

## References

<sup>1)</sup> , <sup>4)</sup> , <sup>25)</sup>

Ramesh VG, Sivakumar S. Extradural hematoma at the vertex: a case report. Surg Neurol. 1995 Feb;43(2):138-9. PubMed PMID: 7892657.

<sup>2)</sup> , <sup>3)</sup> , <sup>11)</sup> , <sup>13)</sup> , <sup>21)</sup> , <sup>31)</sup>

COLUMELLA F, DELZANNO GB, NICOLA GC. [Rare form of epidural hematoma: epidural hematoma at the vertex]. Sist Nerv. 1959 Mar-Apr;11(2):104-18. Italian. PubMed PMID: 13668671.

<sup>5)</sup>  
Matsumoto K, Akagi K, Abekura M, Tasaki O. Vertex epidural hematoma associated with traumatic arteriovenous fistula of the middle meningeal artery: a case report. Surg Neurol. 2001 May;55(5):302-4. PubMed PMID: 11516475.

<sup>6)</sup> , <sup>16)</sup>

Wylen EL, Nanda A. Vertex epidural hematoma with coronal suture diastasis presenting with paraplegia. J Trauma. 1998 Aug;45(2):413-5. PubMed PMID: 9715209.

<sup>7)</sup> , <sup>24)</sup> , <sup>28)</sup> , <sup>34)</sup>

Harbury OL, Provenzale JM, Barboriak DP. Vertex epidural hematomas: imaging findings and diagnostic pitfalls. *Eur J Radiol.* 2000 Dec;36(3):150-7. PubMed PMID: 11091016.

8) 36)

Navarro JN, Alves RV. Vertex epidural hematoma: A rare cause of post-traumatic headache and a diagnostic challenge. *Surg Neurol Int.* 2016 May 6;7(Suppl 10):S276-8. doi: 10.4103/2152-7806.181982. eCollection 2016. PubMed PMID: 27213114.

9)

Borzone M, Gentile S, Perria C, Rivano C, Rosa M. Vertex epidural hematomas. *Surg Neurol.* 1979 Apr;11(4):277-84. PubMed PMID: 441913.

10) 33)

Ramesh VG, Kodeeswaran M, Deiveegan K, Sundar V, Sriram K. Vertex epidural hematoma: An analysis of a large series. *Asian J Neurosurg.* 2017 Apr-Jun;12(2):167-171. doi: 10.4103/1793-5482.145555. PubMed PMID: 28484524; PubMed Central PMCID: PMC5409360.

12) 14) 26)

Miller DJ, Steinmetz M, McCutcheon IE. Vertex epidural hematoma: surgical versus conservative management: two case reports and review of the literature. *Neurosurgery.* 1999 Sep;45(3):621-4; discussion 624-5. PubMed PMID: 10493382.

15) 18) 20) 22) 32)

Alexander GL. EXTRADURAL HAEMATOMA AT THE VERTEX. *J Neurol Neurosurg Psychiatry.* 1961 Nov;24(4):381-4. PubMed PMID: 21610904; PubMed Central PMCID: PMC495403.

17)

Messori A, Pauri F, Rychlicki F, Veronesi V, Salvolini U. Acute posttraumatic paraplegia caused by epidural hematoma at the vertex. *AJNR Am J Neuroradiol.* 2001 Oct;22(9):1748-9. PubMed PMID: 11673172.

19)

Da Pian R, Benati A, Bricolo A, Tomasi A, Perbellini D, Dalle Ore G. Traumatic extradural hematoma of the middle third of the superior sagittal sinus (Italian) *Osp Ital Chir.* 1963;8:667-76.

23) 27)

Messori A, Pauri F, Rychlicki F, Veronesi V, Salvolini U. Acute posttraumatic paraplegia caused by epidural hematoma at the vertex. *AJNR Am J Neuroradiol.* 2001 Oct;22(9):1748-9. PubMed PMID: 11673172.

29)

Columella F, Gaist G, Piazza G, Caraffa T. Extradural haematoma at the vertex. *J Neurol Neurosurg Psychiatry.* 1968 Aug;31(4):315-20. PubMed PMID: 5684390; PubMed Central PMCID: PMC496367.

30)

Miller DJ, Steinmetz M, McCutcheon IE. Vertex epidural hematoma: surgical versus conservative management: two case reports and review of the literature. *Neurosurgery.* 1999 Sep;45(3):621-4; discussion 624-5. PubMed PMID: 10493382.

35)

Fernandes-Cabral DT, Kooshkabadi A, Panesar SS, Celtikci E, Borghei-Razavi H, Celtikci P, Fernandez-Miranda JC. Surgical Management of Vertex Epidural Hematoma: Technical Case Report and Literature Review. *World Neurosurg.* 2017 Jul;103:475-483. doi: 10.1016/j.wneu.2017.04.040. Epub 2017 Apr 17. PubMed PMID: 28427975.

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