

# An Unusual Case of Cerebral Sinovenous Thrombosis Following Minor Closed Head Injury

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## ABSTRACT

We report on an eight year old boy who had presented to us twelve days after sustaining a minor closed injury, with complaints of persistent headache, vomiting and diplopia. On examination he was found to have left lateral rectus palsy and established papilledema. Initial investigations which included a computed topography of the brain was normal. Due to the persistence of signs and symptoms after symptomatic treatment a MRI with venogram was undertaken which revealed right sided transverse and sigmoid sinus thrombosis. He was treated conservatively with oral anticoagulants. The report illustrates the need for MRI and MRV in addition to CT brain in persistently symptomatic patient after minor head injury.

**KEY WORDS :** Head injury, Closed, Sinus thrombosis, Intracranial, Magnetic resonance imaging

## Introduction

Minor head injury is defined as a patient with a history of loss of consciousness, amnesia, or disorientation and a Glasgow coma scale score of 13-15. Although most patients with minor head injury can be discharged without

sequelae after observation, a small proportion deteriorate and require neurosurgical intervention for intracranial haematoma[1]. Computerized tomography (CT) is the reference standard for emergently diagnosing traumatic brain injuries, however some brain injuries are not seen on CT[2]. Cerebral sinovenous thrombosis in children is one such rare complication following closed head injury in which preliminary CT scans may be apparently normal or only show subtle abnormalities which can be easily missed can be and can be optimally diagnosed in children by magnetic resonance imaging (MRI) with magnetic resonance venogram MRV [3-4]. The present report exemplifies this and illustrates the importance of additional imaging to CT in patients with minor head trauma who have persistent symptoms.

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## Case Report

An 8 year old male child presented to us 12 days after sustaining a minor head injury, in the form of a fall from height of 6 feet. It was an accidental fall while playing, following which he had a brief loss of consciousness which lasted for a minute. He was normal for the next 4 days with no external swelling or bleeding and hence was not taken to the hospital. He started having repeated vomiting, progressive occipital headache from the fifth day. He developed diplopia and was noticed by his parents to have squint by tenth day of injury. He was brought to our attention on 12th day with all of the above complaints. Past history was insignificant.

On initial examination there was no evidence of any penetrating trauma to the head and was hence suggestive of closed head injury. He was found to have left lateral rectus palsy with fundus examination revealing bilateral papilledema. His neurological and systemic examination were otherwise essentially normal. On a presumptive diagnosis of intracranial bleed, patient underwent a CT brain which was reported to be normal. His hematological parameters including complete blood count, haematocrit and coagulation profile were within normal limits. In view of the clinical findings suggestive of raised intracranial tension patient was started on intravenous mannitol. Since arboviral encephalitis and tuberculous meningitis are common in our part of India, which can also present sub acutely with similar features; our patient underwent an infectious panel workup. This included a chest roentogram, mantoux test for tuberculosis and serological tests for dengue and japanese encephalitis. No abnormality was detected in any of these tests, A lumbar puncture was deferred due to the persistence of papilledema.

In view of persistence of features suggestive of raised intracranial tension after 24 hours of mannitol with negative infectious panel; a strong clinical suspicion of cerebral sinovenous thrombosis was raised. The patient underwent MRI brain with MRV. MRI brain revealed right sided transverse sinus thrombosis and this was confirmed by MRV which in addition revealed right sigmoid sinus partial thrombosis [Fig.1 & Fig.2]. In view of the association of cerebral sinovenous thrombosis with inherited clotting disorders, estimation of protein C and S, factor V Leiden mutation analysis were undertaken, which were found to be within normal limits. In view of the non worsening status of the patient and lack of consensus regarding surgical intervention for such patients, a conservative approach was opted. Patient was discharged on the 10th day of admission, when he showed symptomatic improvement. On follow up after one week there was a noticeable improvement of the right lateral rectus paresis, he no longer had diplopia and fundus examination revealed marked improvement in the severity of papilledema.

## Discussion

The estimated annual incidence of cerebral sinovenous thrombosis is 3 to 4 cases per million population and up to 7 cases per million children [5]. It is an extremely rare complication following closed head injury and usually involves the sagittal sinus (70-80%), transverse and sigmoid sinuses (70%), and may extend to the cerebral veins[6]. Although traumatic cerebral sinovenous thrombosis is common where skull fractures cross the sinus, they can occur in absence of fractures. The exact mechanism of cerebral sinovenous thrombosis following closed head injury is unknown, although several hypothesis have been proposed. These include compression of the sinus by intracranial edema or bleeding,

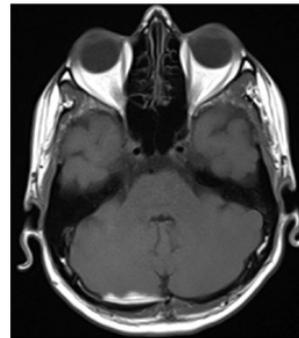
intramural haemorrhage, extension of the trauma from scalp, injured emissary vein, trauma to the sinus endothelium and a sudden rise in ICP causing damage to the endothelial layer of sinuses and cerebral veins[7]. In the present report, the presence of papilledema and absence of intracranial haemorrhage favours a possibility of the later hypothesis.

Predisposing factors for DST (Dural sinus thrombosis) both in general and in patient with minor head trauma includes pregnancy, puerperium, oral contraceptive use, coagulopathies such as protein C and S deficiency, otitis, sinusitis, meningitis, dehydration, connective tissue disorders, nephritic syndrome, metastatic malignancies, indwelling catheters and lumbar puncture[3-6]. Other than the history of minor head trauma no other predisposing factors were present in our patient.

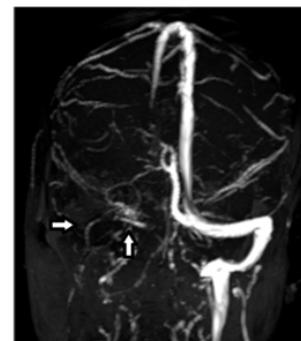
Clinical manifestations of cerebral sinovenous thrombosis are protean and their temporal occurrence can be highly variable. These include headache vomiting, stroke, hydrocephalus, papilledema, visual loss, and pulmonary embolus[3-4]. Diagnosis is usually made by neuro imaging modalities such as CT, MRI and MRV; the latter being the most sensitive. T1-weighted MRI and T2-weighted MRI shown a hyper intense signal from the thrombosed sinuses, and this in combination with a corresponding absence of flow on MRV clinches the diagnosis of cerebral sinovenous thrombosis. High-resolution CT equipment may show the thrombus as a hyper intense signal in a sinus or even in the cortical veins (the cord sign). As exemplified in the present case, CT brain is not as sensitive as MRI in detecting cerebral sinovenous thrombosis. If the diagnosis remains uncertain after MRI or CT venography, cerebral angiography may be indicated. Angiography provides better details of the cerebral veins and hence is useful in the diagnosis of rare cases of isolated

thrombosis of the cortical veins without sinus thrombosis. Angiography may also show dilated and tortuous (corkscrew) veins, which are evidence of thrombosis downstream in the sinuses[3-5].

No consensus has been reached regarding the treatment of patients with DST, as the clinical presentation varies from case to case[7]. Treatment is aimed at preventing cerebral herniation and prevention of extension or new formation of thrombus. Infarcts, a Cochrane systemic review revealed that anti coagulation for patients with DST appeared safe and was associated with risk reduction of death and dependency, though the results were statistically insignificant[8]. Non-dominant sigmoid sinus thrombosis(usually the left)is associated with good outcome[9].



**Fig. No.1: T1 weighted MRI showing thrombosis of the right transverse sigmoid sinus(arrow)57×57 mm(300×300 DPI)**



**Fig. No. 2: The post contrast MR venogram reveals non visualisation of left transverse sinus**

## Conclusion

Sigmoid sinus thrombosis is an extremely rare complication following closed head injury and a high index of suspicion is required for its diagnosis even when preliminary CT scans are normal. The role of MRI in persistently symptomatic patients after closed head trauma cannot be over emphasized.

## References

1. Stiell IG, Wells GA, Vandemheen K. 2001. The Canadian CT Head Rule for patients with minor head injury. *Lancet*; 357:1391-1396.
2. Kuppermann N, Holmes JF, Dayan PS. 2009. Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. *Lancet*; 374-1160-1170.
3. Sebire G, Taburki B, Saunders DE. 2005. Cerebral venous sinus thrombosis in children: risk factors, presentation diagnosis and outcome. *Brain*; 128:477-489,
4. deVeber G, Andrew, Adunx C .2001. Cerebral sino venous thrombosis in children. *N Engl J Med*; 345; 417-423.
5. Starn J. 2005. Thrombosis of the cerebral veins and sinuses. *N Eng J Med*. 352: 1791-1798.
6. Dalgic A, Secer M, Ergungor F. 2008. Dural sinus thrombosis following head injury: report of two cases and review of the literature. *Turk Neuro surg*; 18:70-77.
7. Sousa J, O'Brien D, Bartlett R .2004. Sigmoid sinus thrombosis in a child after closed head injury. *Br J Neurosurg*; 18: 187-188.
8. Starn J, De Bruijn SE, DeVeber G .2002. Anticoagulation for cerebral sinus thrombosis. *Cochrane Database Syst Rev*; 4:CD002005.
9. Yuen, Gan BK, Seow WT .2005. Dural sinus thrombosis after minor head injury in a child. *Ann Acad Med Singapore*; 34:630-641.