Case Report

Cerebellar Haemorrhage After Corrective Surgery for Scoliosis in a Girl with Arrested Hydrocephalus

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Abstract

A 14-year-old girl with congenital hydrocephalus and early-onset scoliosis presented with sudden onset of severe headache on the fourth postoperative day of scoliosis correction (definitive fusion). On evaluation, she was found to have cerebellar haemorrhage on computed tomography scan with the findings of obstructive hydrocephalus. Posterior fossa bleed with hydrocephalus contributing to raised ICP was suspected initially. Headache persisted despite treating the patient with analgesics and antioedema measures. There was no history of postural variation of headache. As the drain output was not coming down, even by the sixth postoperative day, low cerebrospinal fluid pressure headache was considered and the drain was removed, which resulted in marked improvement of headache. Subsequent wound exploration revealed grade III dural tear at D10 level, which was repaired and the headache subsided completely. The linear pattern of haemorrhage in the cerebellum is classical of remote cerebellar haemorrhage, which is seen rarely following spinal surgeries with associated dural tear.

Keywords: Dural tear, low CSF pressure headache, remote cerebellar haemorrhage

Introduction

Intracranial haemorrhage following spinal surgery is very rare and is often due to dural tear and leakage of cerebrospinal fluid (CSF) during the surgical procedure. Cerebellum is the most common site (56%), and rarely, subdural haemorrhage and intraparenchymal haemorrhage have been reported.[1]

The pathophysiology of cerebellar bleed is presumed to be due to sagging of the brain because of CSF leak, which stretches and occludes the bridging cerebellar veins leading to haemorrhagic venous infarction. Here we describe the case of 14-year-old girl who developed severe headache and was detected to have cerebellar haemorrhage following corrective surgery for scoliosis. The girl incidentally had congenital arrested hydrocephalus also, which made the diagnosis more difficult.

Case Report

A 14-year-old girl with congenital arrested hydrocephalus and early-onset scoliosis underwent surgery for scoliosis correction (definitive fusion+ Ponte osteotomy + long segment posterior spinal fusion and instrumentation D4–L5) [Figure 1]. She had mild delay in developmental milestones, and imaging showed moderate hydrocephalus. The hydrocephalus was non-progressive; hence, she was advised no intervention for the same. She had undergone three procedures previously for stepwise scoliosis correction – growth rod implantation, growing rod lengthening at the age of 10 years and growing rod release at the age of 11 years. She developed severe episodic headache associated with photophobia, nausea and vomiting in the fourth postoperative day. The pain was maximal over the back of head and neck and over the retro-orbital region. There was no postural variation. She preferred to lie down mostly with eyes closed because of severe photophobia.

Computed tomography of the head revealed multifocal linear haemorrhages in the left cerebellar hemisphere, along the superior cerebellar folia and the posterior cerebellar surface, with mild mass effect and indentation of the fourth ventricle [Figures 2 and 3]. There was absence of septum pellucidum and significant hydrocephalus with dilatation of lateral and third ventricles (with minimal interstitial oedema). Headache was considered to be secondary to raised intracranial pressure (ICP) in the presence of posterior fossa bleed with indentation of the fourth ventricle producing exacerbation of obstructive hydrocephalus.

Hence, she was started on mannitol and hypertonic saline along with analgesics. Close monitoring for signs of neurological deterioration was continued. In spite of the measures to reduce raised ICP, headache persisted. She remained irritable with

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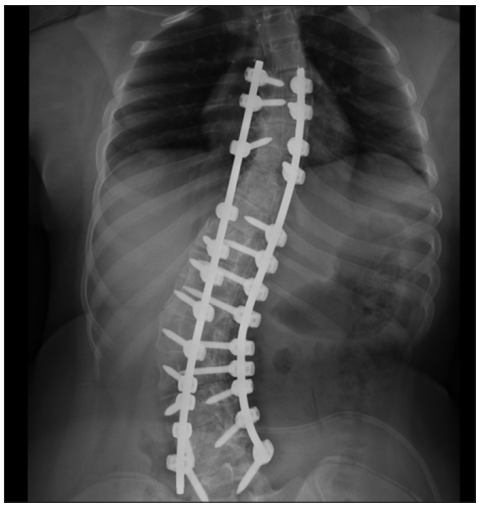

Figure 1: Definitive fusion+ Pontes osteotomy + long segment posterior spinal fusion and instrumentation D4–L5 (post-op image)

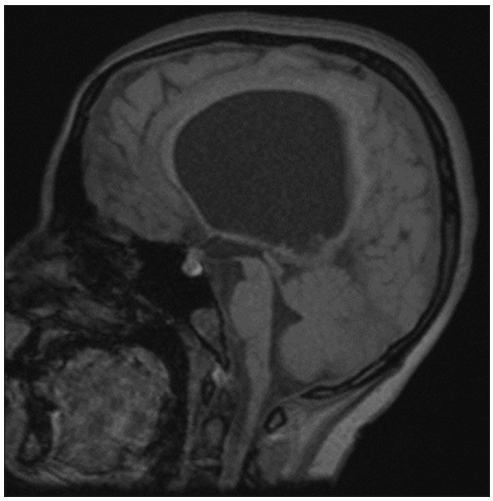

Figure 2: MRI (T1) sagittal image showing absent septum pellucidum and significant hydrocephalus with dilatation of lateral and third ventricles. MRI = magnetic resonance imaging

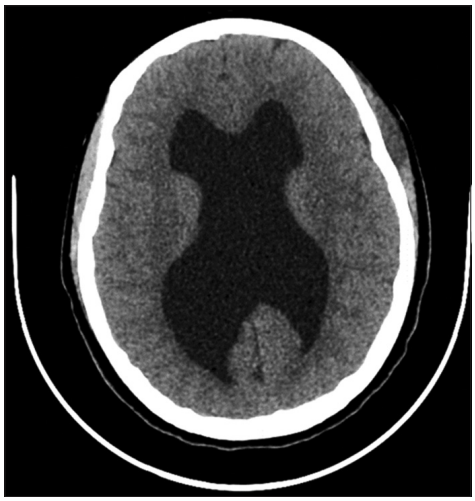

Figure 3: CT of the head axial image showing significant dilatation of the lateral ventricles. CT = computed tomography

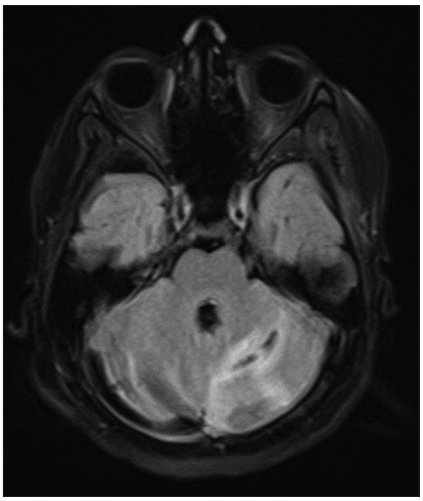

Figure 4: MRI (T2) axial image showing multifocal linear haemorrhages in the left cerebellar hemisphere along the superior cerebellar folia and posterior cerebellar surface with the characteristic layering pattern and a mild mass effect with indentation of the fourth ventricle. MRI = magnetic resonance imaging

inconsolable crying during the episodes of headache. It was decided to continue the conservative management as the child's sensorium was normal and there was no increase in the size of the bleed or hydrocephalus on repeat imaging [Figure 4].

Magnetic resonance angiogram and venogram were done to rule out vascular causes of bleed and were within normal limits.

Supportive measures were taken, and analgesics were given for pain management. Nevertheless, she continued to have headache. It was noted that the output from the subdural drain was not reducing even after the sixth postoperative day. Then the possibility of intracranial hypotension secondary to CSF leakage was considered, which is an important cause of multifocal linear haemorrhages in the cerebellum. Drain was removed on the same day, which resulted in dramatic reduction of headache. On exploration of the wound, type III dural tear at D10 vertebra on the left side was identified and repaired. The girl was discharged without any neurological deficits.

Discussion

Intracranial hypotension can complicate spinal surgeries when there is accidental dural tear and CSF leak. Clinical features can mimic the features of raised ICP, the most common symptoms being headache, dizziness and vomiting. Decreased level of consciousness and neurological deterioration and even death may occur rarely, especially if undetected. Orthostatic headache is a specific feature of headache and if present, is diagnostic of low CSF pressure.[2] Intracranial hypotension can be detected in neuroimaging by

the classical findings of diffuse dural enhancement with dural thickening, engorgement and dilatation of venous structures, enlargement of the pituitary, downward displacement of the midbrain and herniation of cerebellar tonsils.[2] But these findings were not seen in our case, as the girl had congenital hydrocephalus before.

Cerebellar haemorrhage is a known complication seen following supratentorial craniotomies and rarely following spinal surgeries.[3] This is known as remote cerebellar haemorrhage (RCH), as the bleeding occurs away from the site of surgery. RCH due to supratentorial surgeries is three times more common than those following spinal surgeries. The incidence of RCH following spinal surgery ranges from 0.08% to 0.26%.[4] Most of the cases are benign or self-limiting. RCH is more common in middle-aged people, and the incidence in children less than 15 years is only 7.3% according to a recent meta-analysis.[1]

The haemorrhage has a characteristic layering pattern between the cerebellar folia, giving rise to the appearance of zebra's coat with alternating curvilinear hyperdense and hypodense stripes (zebra sign).[5]

Pathogenesis of RCH is not very clear and is thought to be linked to the CSF flow dynamics. Excess CSF leakage results in displacement of the cerebellum inferiorly, resulting in venous infarction secondary to the stretching, occlusion and tearing of the vermian and superior cerebellar veins. Associated increase in venous pressure triggers the cerebellar haemorrhage. This is known as the sinking brain syndrome. Arterial origin of RCH has also been postulated.[6-8] Our case is unique in that, the associated congenital hydrocephalus acted as a red herring, making the diagnosis of intracranial hypotension difficult.

We have not come across any similar case, even after extensive literature search. High suspicion of dural tear should be kept in mind, especially in the presence of headache following spinal surgery and evidence of RCH. Persistently increased drain volume should alert the surgeon regarding this possibility. Clamping or removal of the suction drain often results in significant improvement. Early diagnosis could significantly reduce the morbidity in such cases.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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