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Case Report

‘White cerebellar sign’ in immediate postpartum period

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period), its classic radiological appearance and to emphasise the prognostic significance attached to it.

Case report

A twenty seven year old female patient underwent emergency caesarean section for premature rupture of membranes (PROM) with unfavourable cervix at 39 weeks of gestation. The patient was a booked antenatal case. However, the last antenatal visit of the patient was at 24 weeks of gestation and was lost to follow up till the day of admission. During all these visits patient was normotensive with laboratory parameters and ultrasound examination being normal. However, immediately before the surgery, mild increase in the blood pressure (150/90 mmHg) was noted. The surgery was conducted under spinal analgesia and she delivered a live female baby with normal Apgar score. The intraoperative period was uneventful and the patient was apparently well till 2 h after surgery when she complained of headache and nausea. Thereafter the patient had an episode of generalised tonic clonic seizure (GTCS). She was initially managed with magnesium sulphate, diazepam and conservative treatment. In the next 2 h she had repeated episodes of GTCS and became obtunded. She was intubated, electively ventilated and managed with cerebral decongestants, phenytoin, propofol and inotropes. On examination the pupils were bilaterally dilated, not reacting to light and the deep tendon jerk reflexes were brisk. After haemodynamically stabilising the patient (3 h after the first seizure

Introduction

‘White cerebellar sign’ is a classic yet uncommon radiological finding. This sign is encountered when there is a diffuse decrease in the density of the supratentorial brain parenchyma, with relatively increased attenuation of the cerebellum. This sign indicates irreversible brain damage and has a very poor prognosis.^{1–3} It is therefore very important to be aware of this sign and recognise it at the earliest for diagnostic, therapeutic and prognostic purposes. We present a case report of an adult female with uncontrolled seizures in the immediate post-partum period. The case is presented in view of the rarity of this sign (especially in the post-partum

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episode) the non-contrast computed tomography (NCCT) scan was done that revealed diffuse cerebral edema with white cerebellar sign. On NCCT (Fig. 1), the cerebellum appeared markedly hyperdense relative to the supratentorial brain, which was hypoattenuating due to edema. The difference was even more pronounced on CECT scan (Fig. 2) done after intravenously administering non-ionic iodinated contrast agent, supporting the hypothesis of preferential flow to posterior circulation being the cause of white cerebellar sign. The grey and white matter attenuation was not reversed, therefore the reversal sign was not seen in our case. The subarachnoid sulcal spaces were attenuated to the point of non-visualisation. The dural venous sinuses were normal.

The patient deteriorated, despite the immediate and intensive effort, and was declared dead at around 72 h after the caesarean section.

Discussion

White cerebellar sign indicates irreversible brain damage and poor prognosis. One-third of patients demonstrating this sign on CT scan will die.^{1,3} The remainder suffer severe permanent brain damage, later developing diffuse atrophy and cystic encephalomalacia. The literature search about the difference between 'white cerebellum sign' & 'reversal sign' is confusing. The true 'reversal sign' means hypodensity of the peripheral

Fig. 1 – NCCT axial section at trans-cerebellar level reveals relatively hyperdense cerebellum: “White cerebellar sign”. Also noted is diffuse cerebral edema.

Fig. 2 – CECT at trans-cerebellar level demonstrates accentuation of the attenuation difference between the cerebellum and visualized supratentorial structures as compared to the NCCT image.

cortex with sparing of the central white matter, grey matter nuclei and posterior fossa structures, and reversal of the grey white difference.⁴

There are different theories proposed for this sign.^{1,3,5}

- Raised intracranial pressure causes partial venous obstruction resulting in distension of deep medullary veins.
- Preferential flow to posterior circulation
- Transtentorial herniation partially relieving the increased intracranial pressure, and thus increase perfusion of central structures.
- Hypoxia limits ATP production and disrupts the sodium pump. The influx of water and sodium into cells causes cytotoxic oedema. Later, the water content rises in the extracellular and intracellular spaces (vasogenic oedema). Low density changes appear in the areas most vulnerable to hypo perfusion.
- Anoxia and ischemia elevate brain glucose. This hyperglycaemic state preferentially damages the cortex and basal ganglia, as these structures have high metabolic activity, and are vulnerable to tissue hypoxia and hypo perfusion. Cortex and basal ganglia density decrease with loss of normal grey white differentiation. Sometimes the grey density loss is so great that the normal contrast is reversed, i.e. the reversal sign.

Table 1 – Causes of post-partum seizures.

Obstetric
Eclampsia, cerebral venous sinus thrombosis
Idiopathic epilepsy
Regional anaesthesia
Dural puncture
Meningoencephalitis, intracranial haemorrhage, cerebral infarction or pneumocephalus
Treatments used for PDPH such as caffeine, sumatriptan, synacthen and epidural blood patch
Other
Metabolic disturbances, trauma, intracranial tumour, drug and alcohol withdrawal

PDPH: Post-dural puncture headache.

The various causes of post-partum seizures are enumerated in Table 1.⁶ The white cerebellum sign is associated with severe head trauma, birth asphyxia,^{7,8} drowning, status epilepticus, bacterial meningitis, encephalitis, post-cardiac arrest hypoxia.¹ The most likely cause of white cerebellar sign in our case is increased intracranial tension secondary to uncontrolled seizures.

However, few case reports suggest that the white cerebellum sign may not be as ominous as previously thought.⁹

Another sign named 'dark cerebellar sign'¹⁰ is characterized by an ischemic or edematous cerebellum which appears hypodense in contrast to a normal relatively dense cerebrum on CT scan.

Conclusion

White cerebellum sign is an uncommon radiologic finding seen more commonly in cases of paediatric hypoxia. It usually represents severe anoxic – ischemic brain injury and carries a very poor prognosis. Although it is an uncommon radiological finding, but, because of its classic radiological appearance and

the prognostic significance attached to it, this sign assumes importance to the physician and the radiologist.

Conflicts of interest

All authors have none to declare.

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