CASE REPORT

CROSSED CEREBELLAR DIASCHISIS IN A CHILD WITH STATUS EPILEPTICUS: AN UNUSUAL PRESENTATION

Talha[1], Mian Ayaz ul Haq[2], Hira Ishaq[2], Tanveer Fatima[2], Aamir Khan[2]

[1]Department of Surgery, Department of Neurology, Lady Reading Hospital, Peshawar-Pakistan

Crossed Cerebellar Diaschisis (CCD) describes a depression of oxidative metabolism and blood flow in the cerebellum secondary to a supratentorial lesion in the contralateral cerebral hemisphere. The pathophysiology is not clear but appears to be caused by abnormal neuronal connection of the primary to the remote site. The diagnosis is usually done using positron emission tomography (PET) and single-photon emission CT (SPECT) scans. Almost all the reported cases of CCD are caused by acute ischemic stroke in adults. Hence, CCD secondary to status epilepticus, extremely rare and there is limited literature available on it. This is important because it's findings can easily be confused with acute ischemic stroke and similar concurrent diseases. Correct diagnosis can also help localize the cause of the seizures and significantly influence surgical decisions. We present a case of CCD in a child with status epilepticus using MRI of the brain with DWI.

Keywords: Crossed Cerebellar Diaschisis (CCD); Status epilepticus; Seizure in children

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INTRODUCTION

Diaschisis is the phenomenon where there is a functional loss of a part of the brain that is remote to the primary lesion but has neuronal connection to it. Crossed Cerebellar Diaschisis (CCD) describes a depression of oxidative metabolism and blood flow in the cerebellum secondary to a supratentorial lesion in the contralateral cerebral hemisphere[1] and is characterized by loss of functional activity in the effected region[2]. This occurs in contrast to the usual Ipsilateral thalamic signal that would normally be expected in such a case.[3] In such a situation, restricted diffusion and increased T2 signal on the MRI are highly suggestive of it.[5] CCD has been reported mainly in stroke patients, patients with supratentorial tumors and also migraines and encephalitis.[6,7] The diagnosis is done using positron emission tomography (PET) and single-photon emission CT (SPECT) scans in adult -patient population. CCD has rarely been reported on a child with status epilepticus using an MRI in which MRI of the brain with DWI was the tool for investigation, which the authors report in this case.[4]

CASE PRESENTATION

A 14-year-old boy was admitted to the Neurology Department for refractory status epilepticus which had lasted more than 45 minutes along with a documented fever of 102 F. He was a known case of epilepsy for 8 years on Valproate 500mg, twice daily but was never fit free; with around 1 episode per month. During his stay, he was found to have decreased Glasgow Consciousness Score of 8/15. There were no signs of meningeal irritation and his planters were mute. During his stay in hospital, he had multiple episodes of seizures. Baseline investigations were all within normal limits. EEG showed slowing of left hemisphere activity with epileptiform discharges over left frontotemporal leads. MRI showed extensive high signal change to the left cerebral hemisphere, right frontal lobe and right cerebellar hemisphere with involvement of the superficial and deep white matter. (Figure-1). Diffusion-weighted images (DWI) showed gyral restriction of diffusion in the left cerebral hemisphere, right frontal lobe and right cerebellar hemisphere (Figure-2). The appearances in the left cerebral hemisphere and right cerebellar hemisphere are due to Crossed Cerebellar diaschisis (CCD).

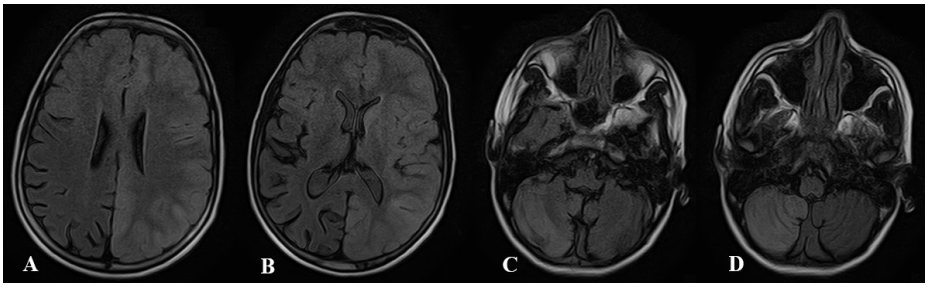

Figure-1: T2 and Fluid attenuated inversion recovery (FLAIR) images.

Axial FLAIR sequence showing hyperintense signals and cortical swelling in almost the entire left cerebral hemisphere, including basal ganglia, right frontal lobe (A and B) and right cerebellar hemisphere. (C and D)

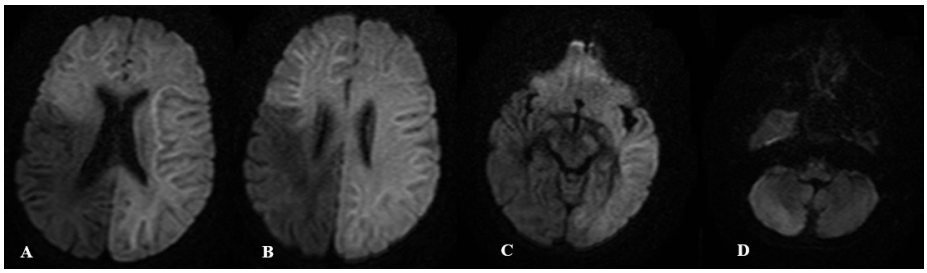

Figure-2: Diffusion Weighted Images

Axial Diffusion weighted images showing restricted diffusion in entire the entire left cerebral hemisphere including basal ganglia (A, B and C) and right cerebellar hemisphere (D). Reciprocal changes were present on ADC map, confirming restricted diffusion

DISCUSSION

Crossed Cerebellar diaschisis is one of the many peri-ictal findings seen on MRI scans. Seizure related blood flow changes like increased prominence of vasculature and hyper perfusion in the ictal region can be elucidated by Perfusion MRI and magnetic resonance angiography (MRA). Post-ictal state is characterized by hypo-perfusion.[8]

Going through the literature, we found only a limited number of case reports of CCD. Most of those reports were secondary to acute ischemic stroke. Though this phenomenon has been reported post-status epilepticus, it has not been reported in a child using an MRI scan.

No clear pathophysiology has yet been discovered but the proposed idea is that it is related to increased neuronal activity with associated metabolic and vascular response. There is an apparent mismatch between glucose utilization and blood flow.[7] The occurrence of remote activity from the site of the primary lesion is likely due to neuronal connections with that site. These lesions are often reversible and hence permanent injury is unlikely unless if the pathology is chronic. This can help differentiate between CCD and acute ischemic stroke.[9] Another difference between the two conditions is that in the later, restricted diffusion precedes the T2 signal abnormality whereas it is synchronous in CCD.[10]

CONCLUSION

CCD can be hard to recognize as it is rare and there is not enough literature available on it. At times, contralateral cerebellar signals can be confusing for neurologists and radiologists alike.[11] Knowledge of this condition is important because these findings can easily be confused with concurrent focal pathologies like brain tumors, secondary acute ischemic strokes or encephalitis. Correct diagnosis can also help localize the cause of the seizures and significantly influence surgical decisions. It is important to remember that peri ictal MRI findings may be a result of the seizure activity rather than the cause hence this would avoid unneeded and often times risky diagnostic and therapeutic interventions.

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Address for Correspondence:
Mian Ayaz ul Haq, Department of Neurology, Lady Reading Hospital, Peshawar-Pakistan
Email: drayazulhaq@gmail.com