Case 13221

Cerebellar pilocytic astrocytoma:
MR spectroscopy
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Section: Neuroradiology
Area of Interest: Neuroradiology brain
Procedure: Education
Imaging Technique: MR
Imaging Technique: MR-Spectroscopy
Imaging Technique: CT
Special Focus: Acute Case Type: Clinical Cases
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Patient: 12 years, male

Clinical History:

The patient presented with a gradual onset of drowsiness and a few episodes of vomiting since one week. Clinical examination and routine hematological examination were normal.

Imaging Findings:

CECT shows a solid cystic lesion in the posterior fossa with proximal triventricular hydrocephalus (Fig 1).
T1WI shows a hypointense lesion in the cerebellum in midline (Fig 2a). T2WI shows a hyperintense lesion in the posterior fossa region with an effaced 4th ventricle (Fig 2b). Post contrast T1WI shows peripheral enhancement of the cyst wall with an eccentric enhancing mural nodule (Fig 3).
On MRS the lesion shows lactate doublet at 1.3ppm with reduced Cr and NAA with elevated Cho peak (Fig 4).

Discussion:

Pilocytic astrocytomas are the second overall most common form of paediatric brain tumours. Cerebellar Pilocytic astrocytoma is the most common cerebellar tumour in children [1]. Magnetic resonance (MR) imaging is used in the diagnosis and follow-up. However, conventional MR imaging does not provide information about tissue biochemistry.
The peak incidence of Cerebellar Pilocytic astrocytoma is between the ages of 5 and 13 years. The WHO classifies pilocytic astrocytoma as a grade 1 tumour. There is virtually no evidence of malignant degeneration within this type of tumour. They commonly occur in the optic chiasm, hypothalamus, and optic nerves and most often are associated with the predisposing syndrome of NF1. The clinical feature is due to the mass effect on adjacent neural structure usually a result of increased intracranial tension. The cysts can be more problematic as a mass effect than the solid portion of the tumour. The solid portion of the tumour is hypodense relative to the cortex, and the cystic portion of the tumour is even more hypodense on CT. The solid portion shows contrast enhancement. On MR, typically the solid portion of these tumours is hypointense on T1 and hyperintense on FLAIR / T2. The MRS spectra of pilocytic astrocytoma revealed high Cho/NAA and Cho/Cr ratios (3.53 ± 1.5) and (7.21 ± 4.2), respectively, relative low concentrations of creatine with an increased NAA/Cr ratio (2.32 ± 1.1). Lactate doublet was detected in all cases while no lipid peaks were detected [2].
Hwang et al. found that pilocytic astrocytoma has relatively high Cho/NAA and Cho/Cr ratios, 3.4 ± 2.14 and 3.46 ± 1.46 respectively, with an elevated lactate doublet which was observed in all the studied cases. No dominant lipid peak was observed [3]. Cecil et al. stated that pilocytic astrocytomas exhibit elevated lactate, Cho and diminished
levels of NAA, Cr, and mIns [4]. MRS of medulloblastoma is characterised by high choline peak. Absent or low lipid peak has also been described in medulloblastoma and is said to be useful in the differential diagnosis from metastasis or astrocytoma. Taurine peak is thought to be relatively specific for medulloblastoma. MR spectroscopy should be a part of the routine MR examination for cases with suspected pilocytic astrocytoma as it could increase the imaging diagnostic efficiency of such tumours even before surgical removal or histopathological examination. Take home message: Pilocytic astrocytoma has a specific metabolic profile which is characterized by low creatine, elevated choline/creatine and N-acetyl aspartate/creatine ratios with the presence of lactate doublet at 1.3 ppm.

**Differential Diagnosis List:** CEREBELLAR PILOCYTIC ASTROCYTOMA, Cystic medulloblastoma, pilocytic xanthoastrocytoma

**Final Diagnosis:** CEREBELLAR PILOCYTIC ASTROCYTOMA

**References:**


Description: Shows cystic lesion with eccentric enhancing mural nodule in posterior fossa

Origin: jnmch
**Figure 2**

**a**

Description: T1WI shows hypointense lesion in the posterior fossa. Origin: jnmch

**b**

Description: T2WI shows hyperintense lesion in posterior fossa with effaced 4th ventricle and triventricular hydrocephalus with eccentric intermediate signal intensity solid component. Origin: jnmch
**Description:** Post contrast T1WI shows peripheral enhancing cystic lesion with eccentric mural nodule.

**Origin:** jnmch
Figure 4

Description: MRS shows lactate doublet at 1.3ppm and elevated CHO peak at 3.2ppm and reduced NAA peak and increase cho/Cr and cho/NAA ratio. Origin: jmch