Hurler holes in Hunter syndrome

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DESCRIPTION

A 16-year-old male presented to our hospital with complaints of mild mental retardation, umbilical and bilateral inguinal hernias, distended abdomen, profound bilateral hearing loss and recent onset seizures. On physical examination, he had a short stature, thick rough skin, depressed nasal bridge, macroglossia, macrocephaly, hypertrichosis and fixed joint abnormalities with contractures and scoliosis (figure 1, obtained with the patient's permission). No family history of a related syndrome was present on either the paternal side or the maternal side. The patient underwent ultrasonography of the abdomen, which revealed moderate hepatosplenomegaly, and umbilical and bilateral inguinal hernias. The patient underwent a urine spot test for mucopolysaccharidosis (MPS) type II screening, which came positive. Confirmatory analysis was performed by enzyme assay, which revealed diminished activity of iduronate 2-sulfatase enzyme in plasma at 1.2 mol/L/hour (reference value: >2 mol/L/hour).

For further evaluation of his neurological symptoms, the patient underwent MRI findings that demonstrated bicoronal, lambdoid and sagittal synostosis with abnormal skull shape. Multiple well-defined rounded cystic lesions involving the corpus callosum were observed, which appeared hyperintense on T2-weighted image (WI) and hypointense on T1WI/fluid-attenuated inversion recovery (FLAIR) (figure 2A). Multiple tiny abnormal T2WI/FLAIR hyperintense signal areas were noted in the periventricular and deep white matter in bilateral cerebral hemispheres (figure 2B) (appeared hypointense on T1WI, without any true restriction on diffusion-weighted imaging or any blooming on susceptibility-weighted imaging). Bilateral proptosis was present with prominent cerebrospinal fluid (CSF) in the dural sheath over bilateral optic nerves (optic nerve sheath diameter— right 8.5 mm and left 9.5 mm) (figure 2C). The MRI also depicted the prominence of extra-axial CSF spaces. In addition, a 2.1×0.9×1.5 cm sized extra-axial CSF signal intensity lesion was found in the right temporal region, representing prominent extra-axial CSF spaces/arachnoid cyst) (figure 2D). All the above findings suggested a diagnosis of MPS type II.

All investigations were in favour of MPS II. After diagnosis, the patient was started on enzyme replacement therapy. The patient is doing fine till the last follow-up.

Hunter syndrome (HS) is an X-linked recessive MPS type II syndrome caused by the deficiency of iduronate 2-sulfatase enzyme. This causes the accumulation of glycosaminoglycans (GAGs), dermatan and heparan sulfate in the body's extracellular and intracellular compartments, leading to multisystem organ abnormality.[1] HS is a heterogeneous disorder both in an age of onset of the symptoms and severity. It is labelled as mild and severe based on the survival length and the presence or absence of neurological symptoms .

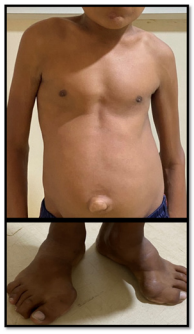

Figure 1 Clinical photograph of the patient with Hunter syndrome having classic features such as scoliosis, distended abdomen, umbilical hernia and flexion deformities in extremities.

Neuroradiological MRI in patients with HS is related to the deposition of GAGs and a strange flow of CSF into the brain parenchyma. The clinician can acknowledge a large spectrum of severity based on MRI findings, from negligible to severe.[2] Typically, multiple prominent perivascular spaces (PVSs) are observed in the periventricular white matter and corpus callosum due to the deposition

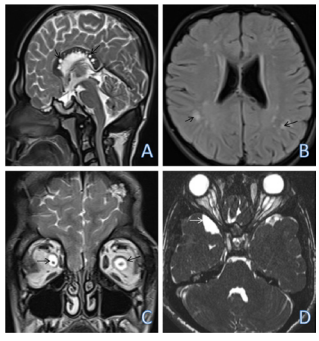

Figure 2 MRI findings in a 16-year-old male with Hunter syndrome: (A) Sagittal T2-weighted image of the brain demonstrates multiple well-defined rounded cystic lesions (Hurler holes) involving the corpus callosum (black arrow), and (B) axial fluid-attenuated inversion recovery image of the brain revealed symmetric periventricular and deep white matter involvement (black arrows). There is associated mild ventriculomegaly. (C) Coronal T2-weighted image of the brain shows prominent cerebrospinal fluid (CSF) in the dural sheath over bilateral optic nerves (black arrow), and (D) three-dimensional constructive interference in steady-state image shows extra-axial CSF signal intensity area in the right temporal region (white arrow).

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Patient's perspective

I belong to a middle-class socioeconomic background, and I came to know that my son is suffering from a rare disease. He appeared completely normal at birth. We suspected some abnormalities in him between 1 and 3 years of age. We took him to many hospitals, and we came to know about this rare disease, which is progressive and had a poor prognosis; this made me and my whole family very sad; seeing my child growing up as not usual is very painful; he was not able to do all work efficiently as his age group children do. Highly demanding care of my child had put much stress on my family and me. Then we came here, and the doctor counselled us very well; they answered all my queries regarding my child's treatment options and future prospects. They made us aware of the disability benefits and financial help available from various government agencies. My child was examined and investigated here entirely, and I hope that with the help of his study, other people will benefit and will also obtain knowledge about this rare disorder. This gives us motivation and power to live our lives better by helping my child improve his quality of life, like regular physical exercises to improve his joint movements. After coming to this hospital, we felt more confident about our child's treatment.

Learning points

- Neuroradiological MRI has an essential role in diagnosing and managing Hunter syndrome because of the extensive neurological involvement.
- The sieve-like finding in the form of multiple cystic lesions in the corpus callosum and perivascular spaces helps to diagnose the Hunter syndrome.
- The presence of Hurler holes suggests the advanced stage of the disease.

of mucopolysaccharides, also known as Hurler holes. These PVSs look like fluid-filled spaces on MRI historically labelled as holes and may produce a classic sieve-like appearance of the neuroparenchyma.[3] The Hurler holes are typical of both Hurler and Hunter syndrome. These Hurler holes are highly characteristic of MPS and are the key to diagnosis for the radiologist. In the appropriate clinical scenario, these classical MRI features may clinch the diagnosis of MPS.[3] If these Hurler holes appear, it marks the advanced stage of the disease and hence worsens the prognosis. Thus, MRI plays an essential role in the further diagnostic work-up and follow-up of MPS.

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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

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