A child with giant tumefactive perivascular spaces

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A 4-year-old girl was admitted with a 2-day history of a high temperature up to 41°C. She developed sudden-onset generalised tonic-clonic seizure. She had no travel history. Physical examination showed neck stiffness. The working diagnosis was meningitis. Non-contrast computed tomographic (CT) brain prior to lumbar puncture revealed clustered well-defined cystic lesions with no calcifications measuring up to 1.5 cm in the white matter of the right frontal and parietal lobes (Fig 1).

The child subsequently developed status epilepticus. The neurosurgical unit was consulted and brain abscesses were suspected. In view of her clinical deterioration, burr hole and aspiration of the cystic lesions were planned after magnetic resonance imaging (MRI). The signal intensity of the lesions was identical to that of cerebrospinal fluid (CSF) on all MRI sequences (Figs 2 and 3). There was no rim enhancement around the lesions. Minimal fluid-attenuated inversion recovery (FLAIR) hyperintense signals were noted in the white matter adjacent to the lesions. There was no restricted diffusion on diffusion-weighted imaging.

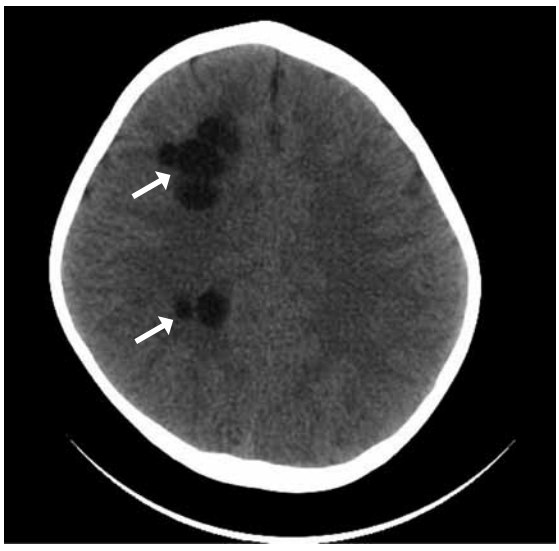

FIG 1. Non-contrast computed tomography of the brain on the day of admission showing clustered well-defined cystic lesions with no calcifications measuring up to 1.5 cm in the white matter of the right frontal and parietal lobes (arrows)

Imaging features were not compatible with brain abscess so surgical aspiration was withheld. Cerebral hydatid disease was considered a possible diagnosis based on imaging and the child was commenced on oral albendazole 15 mg/kg/day. This diagnosis was subsequently disproved given the lack of an exposure history, absence of *Echinococcus granulosus* antibody in serum, and absence of cysts in the liver and spleen on ultrasonography.

Influenza A virus antigen was subsequently detected in nasopharyngeal aspirate. The child was prescribed antiviral treatment with consequent cessation of seizures and clinical improvement. The clinical diagnosis was influenza virus–associated encephalopathy.

Follow-up CT and MRI 3 weeks later showed the non-enhancing cystic lesions to be unchanged in size and signal characteristics. The lesions were classified as giant tumefactive perivascular spaces (GTPVS).

The perivascular spaces (PVS) of the brain are pial-lined, interstitial fluid-filled cystic spaces. They accompany penetrating arteries as they enter the brain parenchyma. These are normal structures that can be found in all ages.[1] Most PVS are small in size and usually measure less than 5 mm.[1] Larger (>1 cm) PVS have been reported and these are called GTPVS, which can occur as single or multiple clustered cysts.[2] Such GTPVS in cerebral white matter can have mild FLAIR hyperintensities in the surrounding white matter[1] that can be due to gliosis.[2]

Of note, GTPVS are often incidental findings on imaging. They occur in characteristic locations alongside penetrating vessels in the mesencephalothalamic area, cerebral white matter, and cerebellar dentate nuclei.[2] They follow the CSF signal on MRI and do not enhance.

Sometimes, GTPVS can be misinterpreted as other pathological processes.[1-3] Lack of a solid component and complete suppression on FLAIR differentiates them from cystic neoplasms.[1] Nil to minimal peri-lesional FLAIR signals help to differentiate them from cystic infarction and mucopolysaccharidosis. Parasitic cysts, in particular hydatid cysts, can have identical imaging features and necessitate clinical correlation for exclusion as in this case. Neuroepithelial cysts also have identical imaging features but can only be differentiated from GTPVS by histopathology.[1] Knowledge of this entity, its imaging features, and characteristic locations is

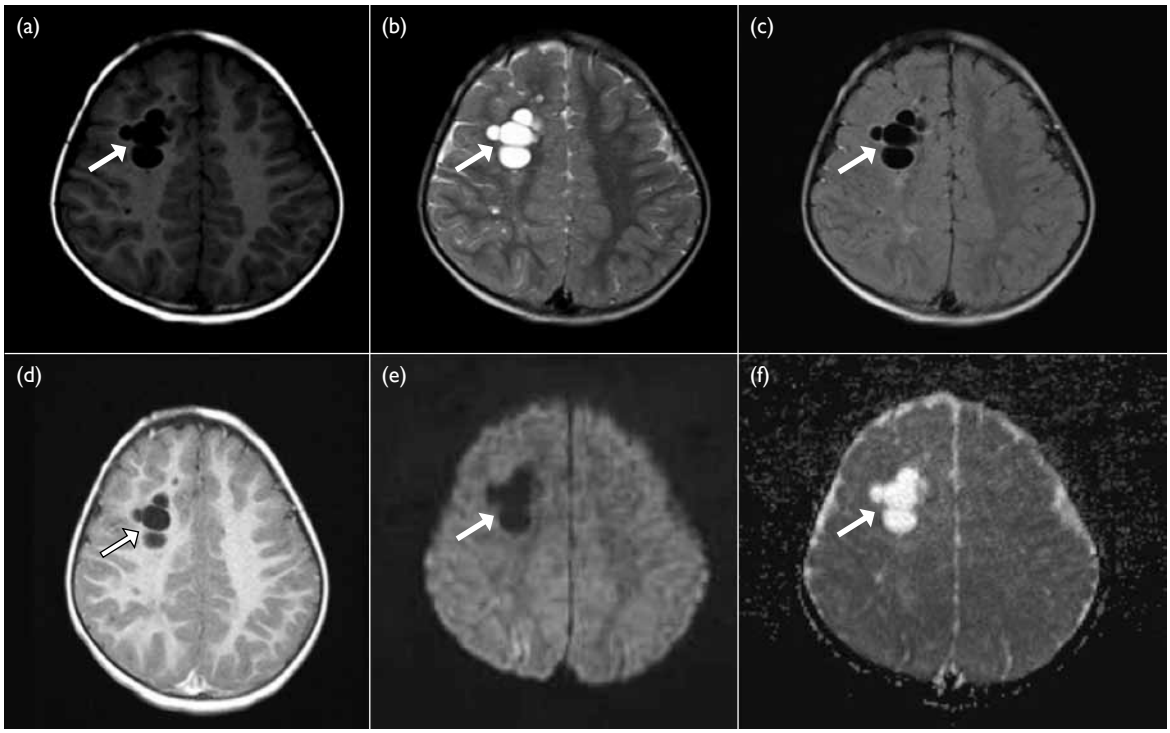

FIG 2. Magnetic resonance imaging (MRI) on day 2 following admission at the level of the right frontal lobe lesions
(a) T1-weighted, (b) T2-weighted, (c) fluid-attenuated inversion recovery (FLAIR) imaging showing the lesions to be identical to cerebrospinal fluid signal on all MRI sequences. Minimal FLAIR hyperintense signals seen around the cysts are suggestive of gliosis (arrows). (d) No enhancement on post-gadolinium scan is shown (arrow). (e) Diffusion-weighted imaging and (f) apparent diffusion coefficient map showing no restricted diffusion (arrows)

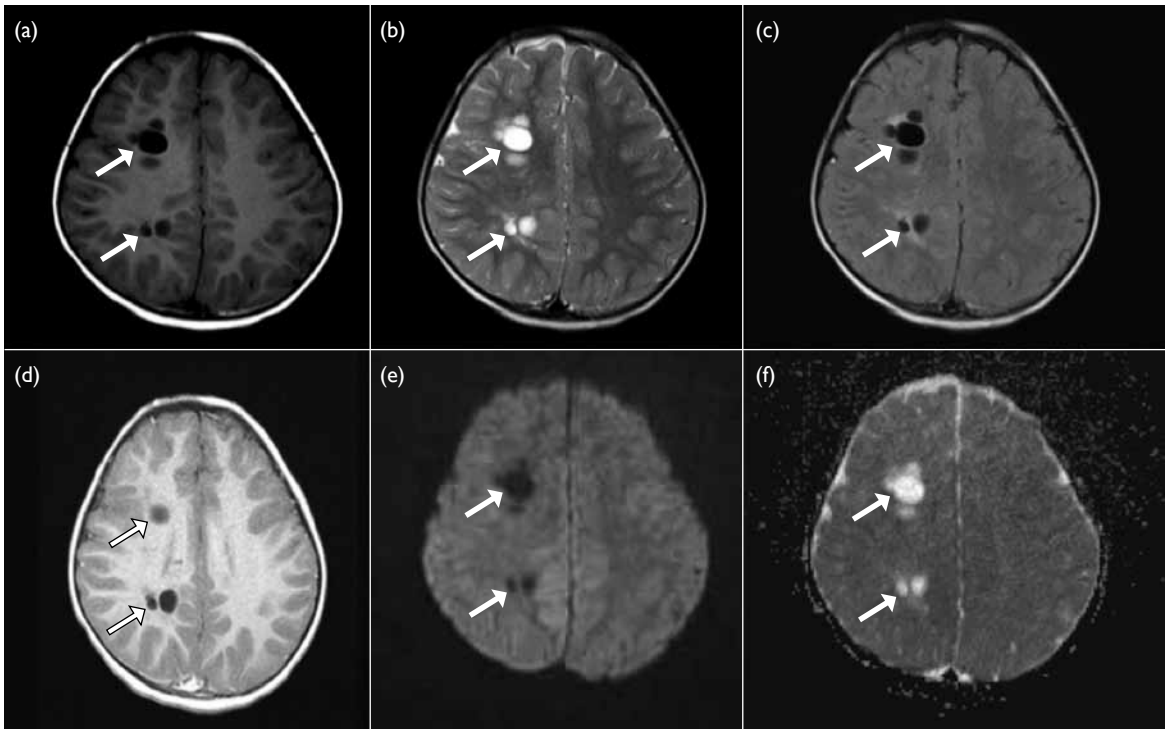

FIG 3. Magnetic resonance imaging (MRI) on day 2 following admission at the level of the right parietal lobe lesions
(a) T1-weighted, (b) T2-weighted, (c) fluid-attenuated inversion recovery (FLAIR) imaging showing the lesions to be identical to the cerebrospinal fluid signal on all MRI sequences. Minimal FLAIR hyperintense signals seen around the cysts are suggestive of gliosis (arrows). (d) No enhancement on post-gadolinium scan is shown (arrows). (e) Diffusion-weighted imaging and (f) apparent diffusion coefficient map showing no restricted diffusion (arrows)

essential to avoid unnecessary medical treatment and surgical biopsy/intervention.

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