Magnetic resonance spectroscopy of a cerebral parasitic cyst

Spectroscopie par résonance magnétique d’un kyste cérébrale parasitaire

A 9-year-old boy, living in France under substandard conditions of hygiene, presented with right hemiparesis and left oculomotor nerve palsy that had progressively worsened over 3 weeks. Magnetic resonance imaging (MRI) disclosed a well-defined, round 6-cm lesion in the left frontoparietal region with cerebrospinal fluid (CSF)-like signal intensity and a mass effect (Fig. 1). A thin hypointense peripheral rim was noted on T2-weighted images, and there was no diffusion restriction, peripheral edema or enhancement (Figs. 2 and 3). Magnetic resonance spectroscopy ([MRS]; Fig. 4) revealed a succinate peak (2.4 ppm), an inverted lactate peak (1.3 ppm), a smaller alanine peak (1.48 ppm) and an acetate peak (1.9 ppm). These features suggested an infectious cyst. However, hydatidosis and cysticercosis serology and hepatic ultrasound examination were negative.

Surgical removal via a left frontal craniotomy and hydrodissection of the cyst was performed to avoid rupture (Fig. 5). The postoperative recovery was complete,
Figure 4 Monovoxel MRS within the cyst at (a) short and (b) long echo times reveals the presence of a succinate peak at 2.4 ppm, an inverted lactate peak at 1.3 ppm, a smaller alanine peak at 1.48 ppm and a smaller acetate peak at 1.9 ppm, but no choline, creatine or N-acetylaspartate peak.

Figure 5 Macroscopic view of hydrodissection of the cyst reveals a translucent fluid cyst.

and albendazole treatment for 1 month was prescribed. No recurrence was observed. Anatomopathological examination revealed a sterile parasitic cyst containing no protoscoleces, and ruled out neuroglial cyst and tumor.

Although histopathological examination failed to identify tapeworm, we consider this lesion to be a sterile hydatid cyst rather than neurocysticercosis because of the patient’s age; the location of the lesion within the white matter; its size; the lack of rim enhancement, peripheral edema or calcification; and the features seen on MRS.

Hydatid echinococcosis (HE) is a worldwide zoonosis, albeit rarely seen in Western countries [1]. Most patients (80%) have single-organ involvement mainly affecting the liver or lungs. Cerebral involvement is seen in only 2% of patients, most commonly children and affecting the middle cerebral artery territory [1,2]. ‘Daughter’ vesicles are considered pathognomonic, but these are seldom identified, even on MRI [1,2].

HE usually presents as a single, well-defined, rounded cystic lesion with CSF-like signal intensity, and no perilesional edema or contrast enhancement [1]. The hypointense rim observed on T2-weighted images is due to a pericyst (a fibrous capsule derived from reactive host tissue) [1]. Misdiagnosis may occur in Western countries because other causes of cystic lesions, such as neuroglial cyst, giant perivascular spaces, cystic glioma and abscesses, are more frequently encountered than this disease.

However, MRS in vivo may be added to the usual MRI protocol for a more accurate etiological diagnosis of a cystic lesion. The most specific metabolite of HE reported at a peak of 2.4 ppm by Jayakumar et al. [3] was pyruvate, although other studies have assigned this peak to succinate [4–6], as confirmed by mass spectroscopy. In addition to HE, a succinate peak at 2.4 ppm has also been seen in pyogenic abscesses and neurocysticercosis [6].

Other less-specific metabolites, such as lactate and acetate, are suggestive of infectious diseases [4]. MRS studies ex vivo have found malate (4.3 ppm) and fumarate (6.5 ppm) in fertile cysts [4,5]. These metabolites are not found in cysticercosis cysts, but the presence of a creatine peak is specific in that case [6].

In conclusion, MRS is a useful addition to the MRI workup of a cystic lesion of unknown cause, as it can help to identify a parasitic origin in non-endemic countries.

Conflict of interest statement
None.

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