

Looking for the 'pea in a pod' among the 'Swiss cheese' to diagnose neurocysticercosis

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Usually humans act as the definitive hosts for the parasite *Taenia solium*, but they can occasionally also act as the intermediate host where the larval stage (*Cysticercus cellulosae*) lodges in many organs of the body. The computed tomography (CT) and magnetic resonance imaging (MRI) appearances in brain tissue vary according to the stages of evolution of the parasite. On CT, live larvae (vesicular stage) are hypodense (cerebrospinal fluid (CSF) equivalent) round cysts, most commonly at the grey/white interface (Fig. 1). The scolex may be visualised as an eccentric hyperdense nodule on the inner aspect of the cyst wall — the 'pea in a pod' appearance. On MRI the cyst contents are isointense to CSF on all sequences (Fig. 2). MRI is more sensitive for identifying the scolex,

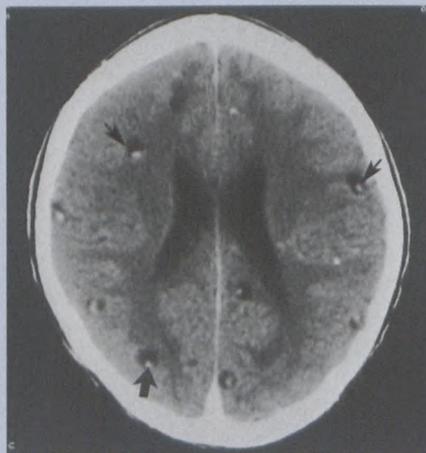


Fig. 1. Contrast-enhanced axial CT of the brain demonstrating the typical appearance of neurocysticercosis, with multiple cysts (thin arrows) situated predominantly at the grey-white interface. The cysts are in the vesicular stage, as there is no surrounding oedema. The scolices are hyperdense (thick arrow), owing to the presence of calcareous corpuscles. This gives rise to the 'pea in a pod' appearance. Calcified foci are noted in the left cerebral hemisphere in keeping with the calcified nodular stage.

which is hyperintense on T1 in the vesicular stage. When the scolex is calcified it shows a signal void on all sequences. When a larva is dying a granuloma forms, and perilesional oedema is seen due to the host response (Fig. 3). The lesion is then seen as a ring or disc-enhancing lesion (Fig. 4). With multifocal ring lesions, the brain may have the appearance of 'Swiss cheese' (Fig. 2). The mural nodule (scolex) also enhances with con-

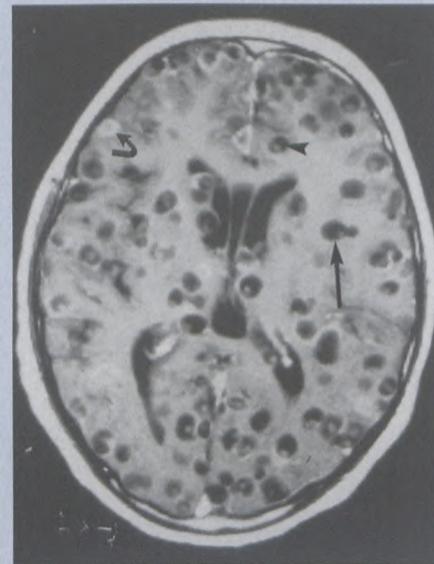


Fig. 2. Contrast-enhanced axial MRI scan of the brain demonstrating 'pea in a pod' (arrow head) among the swiss cheese. Note the presence of lesions in different stages — non-enhancing lesions in the vesicular stage (thin arrow), and discoid/ring-enhancing lesions in the colloidal vesicular stage (curved arrow).

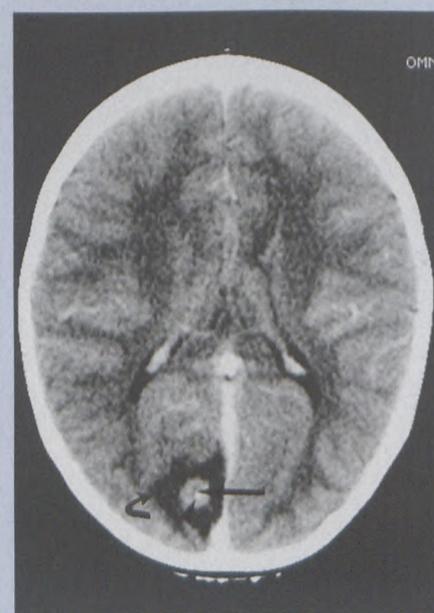


Fig. 3. Contrast-enhanced axial CT of the brain demonstrating single, ring-enhancing granuloma (thin arrow), with a thick capsule, containing a calcifying scolex (arrow head). There is perilesional oedema (curved arrow). These features are in keeping with a lesion in the granular nodular stage.

TIPS FOR THE RADIOLOGIST

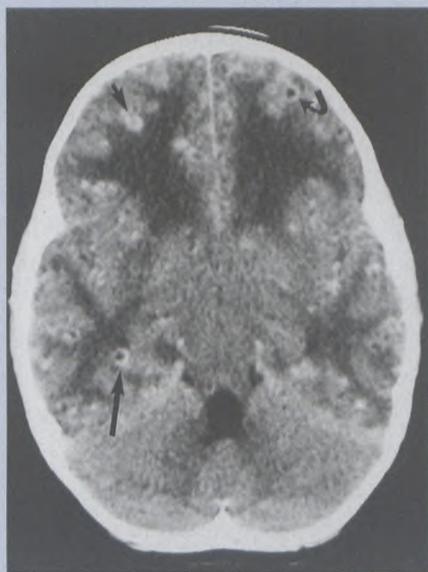


Fig. 4. Contrast-enhanced axial brain CT demonstrating multiple ring-enhancing lesions (long arrow), with surrounding oedema. The 'pea in a pod' appearance of the cyst in the left frontal lobe (curved arrow) confirms cysticercosis as the aetiology. Note also the discolored enhancement (short arrow) of some of the cysts in the colloidal vesicular phase.

trast. At this stage (colloidal vesicular) the cyst content becomes slightly hyperintense to CSF on T1 weighted MRI and hyperintense on T2 weighted MRI. The nodule becomes more visible when gadolinium is used. The hypointense cyst wall is best seen on T2 against the hyperintense fluid content and surrounding oedema.

The next stage of the cyst (granular nodular stage) involves calcification and retraction, with thickening of

the cyst wall (Fig. 3). On CT the cyst is isodense and the scolex is calcified. On MRI the cyst is isointense on T1 and hypo/isointense on T2. When the larvae are dead, cysts and scolices are seen as calcified lesions (Fig. 1), and when there are multiple lesions it is known as the 'starry night' appearance on CT. MRI shows focal areas of signal void. All the above stages may be seen in combination or simultaneously in one patient (Figs 1, 2, 4).

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