

# Trichinosis diagnosed by computed tomography

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**Summary:** Trichinosis is a worldwide disease contained by good husbandry and culinary practice, presenting unexpectedly in individual cases or mini-epidemics. The disease varies greatly in its manifestation and severity although when marked can be recognized by fever with myositis and periorbital oedema. Antibody tests are specific but the appearances on computed tomography of the brain are sufficiently characteristic to allow a confident diagnosis. Two cases where such appearances led to the diagnosis are reported.

## Introduction

A mini-epidemic of trichinosis has lately been described but the radiological manifestations were not considered.<sup>1</sup> In Chinese cuisine pork is thinly sliced but the recent popularity of barbecuing has introduced the risk of infestation by trichinosis in Hong Kong. Furthermore the presence of non-Chinese increases the possibility of encountering this disease in Hong Kong. Two cases of trichinosis are reported, one in a Nepalese child and the other in an indigenous Hong Kong resident, where the computed tomographic (CT) appearances led to the diagnosis being made.

## Case reports

### Case 1

A girl of 8 years of age from Nepal was referred for a CT examination following a left sided focal fit followed by an upgoing left plantar reflex. As a neonate she had had meningitis, probably haemophilus, when a left sided focal fit had also occurred, but since the original illness she had been well with no sequelae. However, a skull radiograph showed enlargement of the right middle fossa with elevation of the lesser wing of the sphenoid and slight

enlargement of the superior orbital fissure (Figure 1).

On physical examination there was no abnormality. Full blood count and ESR were normal apart from 18% eosinophilia (white cell count  $9.3 \times 10^9/l$ ). An arachnoid cyst, possible temporal horn hydrocephalus, or slow growing glioma were considered as possibilities in view of the skull radiograph.

The CT examination revealed two areas of low attenuation in the white matter, one in the right postero-superior aspect of parietal lobe and the other adjacent to the falx in the right frontal lobe (Figure 2). Following intravenous contrast enhancement with 40 ml of conray '280' a small enhanced ring lesion of 8 mm was found adjacent to each of the low density oedematous areas as well as a similar lesion in the left posterior parietal region adjacent to the falx (Figure 3).

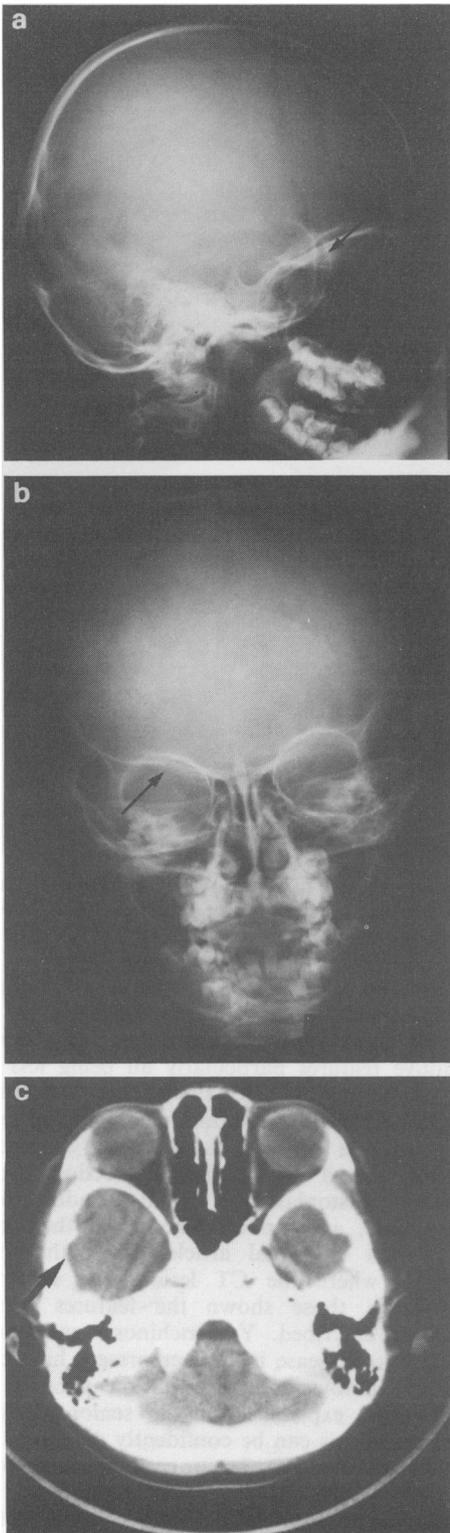
Trichinosis was diagnosed and subsequently the antibody test was found to be positive while serology for cysticercosis and *angiostromylus* were negative.

### Case 2

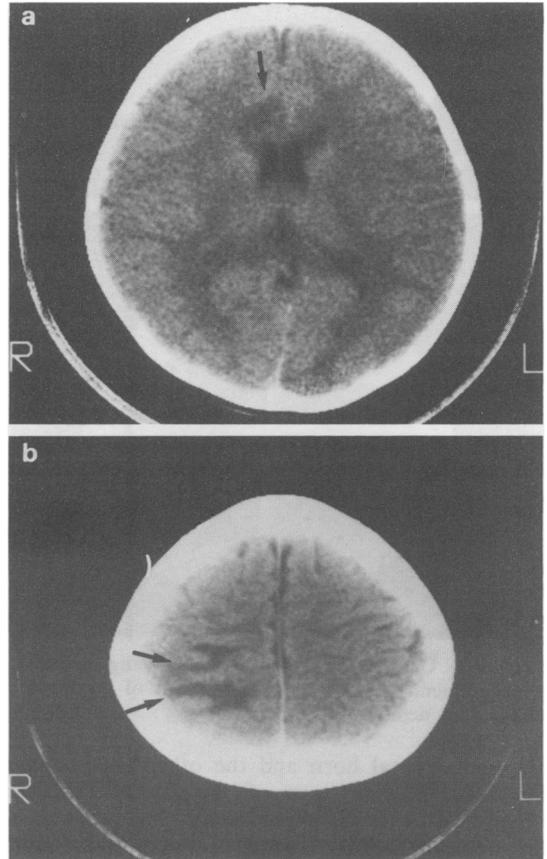
A man aged 43 presented with headache for 3 years but worse in the last few months, maximal over the right parietal region. He gave a history of repeated minor head trauma and in addition a previous CT brain scan was said to have shown a 'rice-sized' tumour in the region of the painful area.

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**Figure 1** Case 1. (a) Lateral view of the skull showing the forward displacement of the middle cranial fossa (arrows). (b) In the frontal view elevation of the lesser wing of the sphenoid on the right is shown (arrow) and slight widening of the superior orbital fissure. (c) The basal section of the CT examination confirms the enlargement of the right middle fossa (arrow).

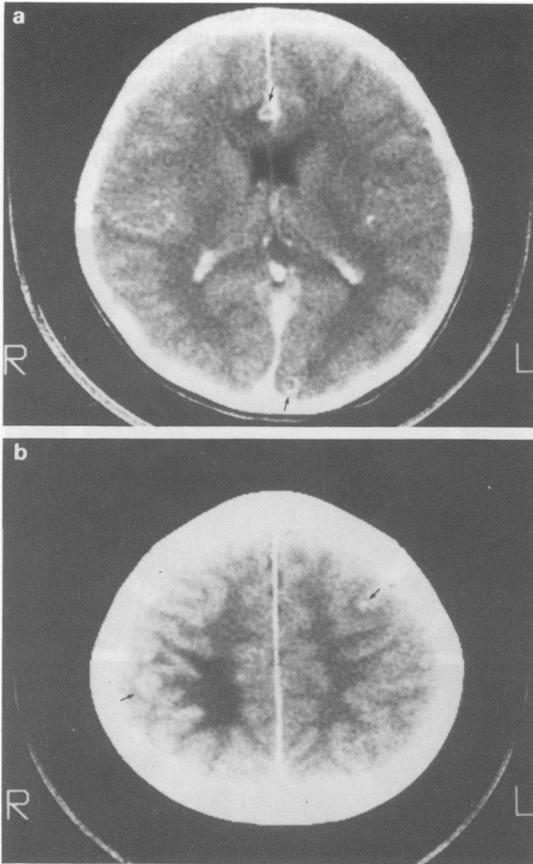


**Figure 2** Case 1. Two areas of oedema of white matter are present, (a) in the right frontal region (arrow) and (b) in postero-superior aspect of the parietal lobe.

Apart from occasional visits to Canton the patient had not been abroad. He could not recall any episode of gastrointestinal upset, severe systemic illness or muscle aches and pains.

General and neurological examination was normal apart from 2 small nodules in the scalp on the right side shown to be lipomata following excision. The peripheral white cell count was  $8.1 \times 10^9/l$  with 1% eosinophils.

CT brain scan showed 3 small calcified rings of 3–8 mm, one lying adjacent to the anterior aspect of



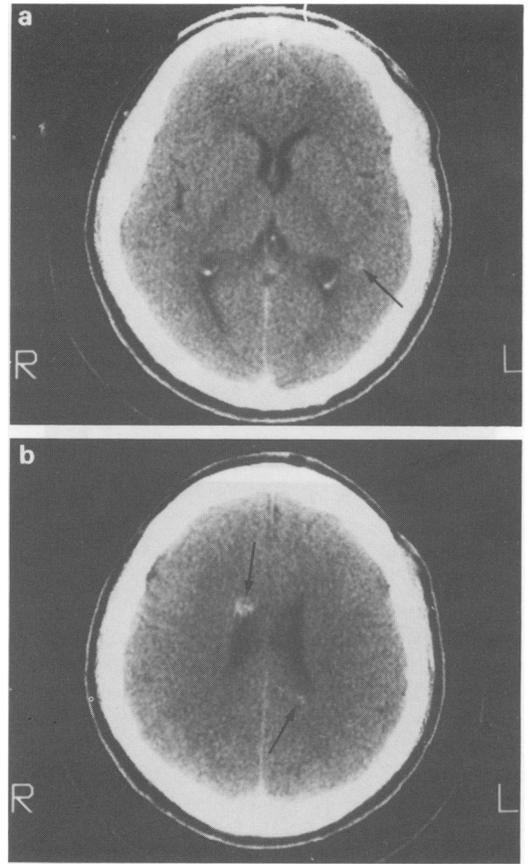
**Figure 3** Case 1. (a) and (b) Following contrast enhancement small ring lesions typical of trichinosis have been demonstrated (arrows).

the right frontal horn and the other two close to the left posterior horn of the lateral ventricles (Figure 4). There was slight contrast enhancement of the anterior lesion (Figure 5) but no surrounding oedema.

Trichinosis was diagnosed and the subsequent serology was shown to be strongly positive for *Trichinella spiralis* larval antibodies (enzyme-linked immunoabsorbent assay). Following a 6 day course of oral mebendazole 100 mg twice daily his headaches rapidly subsided.

### Discussion

Recent editions of major radiological textbooks<sup>2-5</sup> do not include trichinosis let alone cerebral trichinosis in their indices and even in textbooks related specifically to imaging of the brain<sup>6,7</sup> there is no mention of trichinosis. Nor is there a differential diagnosis of multiple cerebral lesions 3-8 mm in



**Figure 4** Case 2. (a) and (b) Three small calcified ring densities can be seen, varying in size from 3-8 mm, typical of trichinosis (arrows).

diameter, all the same size, nodular or ring-like with a surrounding halo of low attenuation.

Similar lesions are illustrated but none show all the above features particularly all being less than 8 mm, some having ring calcifications and enhancing after intravenous contrast medium. The lesions shown include cerebral tuberculosis, sarcoidosis, cysticercosis and various fungal infections such as nocardia, histoplasmosis, and cladosporium.<sup>6</sup> Furthermore, a computer search and the medical index failed to reveal articles other than those quoted<sup>8,9</sup> where the CT lesions are illustrated. However in those shown the features were as previously described. Yet trichinosis and particularly cerebral disease is an ever present hazard due to the ubiquitous occurrence of the parasite.<sup>10</sup> In the personal experience of the senior author in India, trichinosis can be confidently diagnosed with the characteristic CT appearances as shown by the two cases described in this communication.

Multiple sclerosis and small cerebral infarcts



**Figure 5** Case 2. Following contrast enhancement there is slight uniform staining of the surrounding tissue (arrow).

also produce scattered 8mm lesions on contrast enhancement but do not show a ring pattern or surrounding oedema and the clinical presentation with epilepsy is unusual. Furthermore, multiple sclerosis is rare in the indigenous population of Hong Kong.

The CT features of trichinosis on brain scans appear to be sufficiently specific for a confident diagnosis when either small calcified or contrast enhanced rings are demonstrated, a sign particularly helpful in cases presenting with epilepsy. When only low attenuation areas either in the corona radiata or when larger areas of low attenuation indicating vasogenic oedema in the deep white matter are demonstrated, contrast enhancement becomes necessary for a specific diagnosis.

Until recently trichinosis had not been reported from Hong Kong but the changing life style, recourse to fast foods and eating barbecued meat is likely to lead to many more cases being diagnosed in this area.<sup>1</sup>

The ingested viable cysts produce tapeworms that subsequently inhabit the duodenum giving rise to larvae localizing predominantly in striated muscle but are also found in lung, myocardium and

brain.<sup>10</sup> The florid illness is one of fever, muscular aches and pains, myocarditis, respiratory and central nervous system symptoms as well as diarrhoea and periorbital oedema. The initial disease can be so severe as to be fatal or at the other extreme, the initial infestation can be so mild as to go unrecognized. The severity appears to depend on the number of viable cysts ingested.<sup>11,12</sup>

The vast majority of trichinosis infections in man are subclinical<sup>13</sup> while in the latest mini outbreaks in France<sup>8</sup> patients were severely ill from eating underdone or raw horsemeat (steak tartare). Larval counts of more than 1000/g of muscle tend to be fatal<sup>13</sup> unless treated early with steroids and anti-helminthics in adequate dosage. Pickled pig's feet and bear meat are especially hazardous, the latter because the variety of *Trichinella* in polar bear meat is particularly resistant to cold, remaining infective for up to 24 months after being stored at  $-18^{\circ}\text{C}$ .<sup>14</sup> However, adequate cooking at  $80^{\circ}\text{C}$  remains the best safeguard against trichinosis.<sup>15</sup>

In more severe cases there may be symptoms and signs of meningitis, encephalitis, paresis, aphasia, hemianopia, sphincter disturbances, cranial nerve deficits and spinal cord lesions.<sup>11,12</sup>

The severity of central nervous system infestation depends not only on the presence of the larvae but also on the eosinophilic reaction. A neurotoxin has been isolated from eosinophils that damages nerve cells in tissue culture and there is also evidence for neurotoxicity in the hypereosinophilic syndrome.<sup>8</sup> The development of a systemic Jarisch-Herxheimer reaction due to the abrupt dissolution of larvae causing a marked release of protein breakdown products, is a further reason for exhibiting steroids in the treatment of trichinosis.

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