NEUROIMAGING OF THE CNS INVASION OF GNATHOSTOMA SPINIGERUM AND ANGIOSTRONGYLUS CANTONENSIS IN A NORTHERN THAI PATIENT

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ABSTRACT

A case of mixed parasitic infestation of the CNS was demonstrated by CT scan, MRI scan and angiography. The patient was 51-yrs-old female farmer presented with neurological deficits. Gnathostomiasis and Angiostrongyliasis was responsible for the symptoms. Multiple hematomas are seen in the spinal cord, central canal and in the brain. Dissection of the vertebral artery was also noted. Most of the changes represented the manifestation of Gnathostomiasis.

INTRODUCTION

Gnathostoma spinigerum is a tissue nematode with an exceptionally tremendous penetrating power. It can migrate through any anatomical structure of the human body, except bone. G. spinigerum third stage larvae have been recovered from various organs such as the urinary bladder, uterus, intestine, lungs, ears, eyes, spinal cord and brain (1). Common neurological syndromes, i.e. subarachnoid hemorrhage, meningitis, encephalitis, transverse myelitis, ascending myelitis or radiculomyeloencephalitis can be caused by invasion of the parasite into the central nervous system (1). The mortality rate of CNS gnathostomiasis was approximaterly 20 percent and one of the major causes of death was direct parasite invasion into vital centers in the brain stem.

Various snails, slugs, prawns and crabs are intermediate hosts of the Angiostrongylus cantonensis. Humans are usually infected by eating infected intermediate hosts, that have not been properly cooked. In Thailand Pila snails are the main source of infections, the snails are often served in Thailand as a delicacy together with alcohol (2,3). In humans the parasite does not complete its life cycle and dies, for example, within the brain. Here it provokes a marked inflammatory response, the main clinical manifestation being eosinophilic meningitis (2,4)

We presented a case of mixed CNS infection of the two parasites, demonstrated by CT, MRI and angiographic imaging.

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CASE REPORT

A fifty-one years old female from Pijit Province, came in with weakness of the lower extremities for one week. The weakness began firstly from the right side and then progressively towards the left side. She was drowsy. There was bilateral cranial nerve VI palsy and stiffneck. The sphincter tone was loose. The motor power of the lower extremities were grade O, while the upper extremities showed grade 4-5. The CSF was sent to DR. Stitaya Sirisingh Laboratory, Department of Microbiology, Faculty of Sciences, Mahidol University. It was positive for Gnathostomiasis and Angiostrongyliasis with O.D. 1.71 and 0.59 respectively (positive cut-off point = OD. + 0.20). The serum was also positive for the two mentioned parasites with OD. 1.8 and 0.46 respectively.

CT scan of the brain showed subarachnoid hemorrhage (Fig. 1). MRI of the brain showed multiple small intracerebral hematomas at pons, left posteroinferior part of the cerebellum and right cerebellar hemisphere. Large hemorrhagic infarct was noted at left parieto-temporo-occipital area (Fig. 2). The left vertebral artery was not visualized by MRA (Fig. 3).

MRI of the whole spine showed subdural hematoma at posterior aspect of C6 to T10. A hemorrhagic tract was seen along the right paramedian posterior aspect of C5 and C5-6, left paramedian area of C4 and C3. Associated cord edema was seen from CT to C6.

Angiography of the left vertebral artery showed dissection of this artery (Fig. 3).

Mild degree of hydrocephalus was present and CSF shunt was installed. The patient had hospital acquired infection. She was discharged and referred to the hospital in Pijit Province. She was quadriplegia and unable to communicate, at the discharge-time.

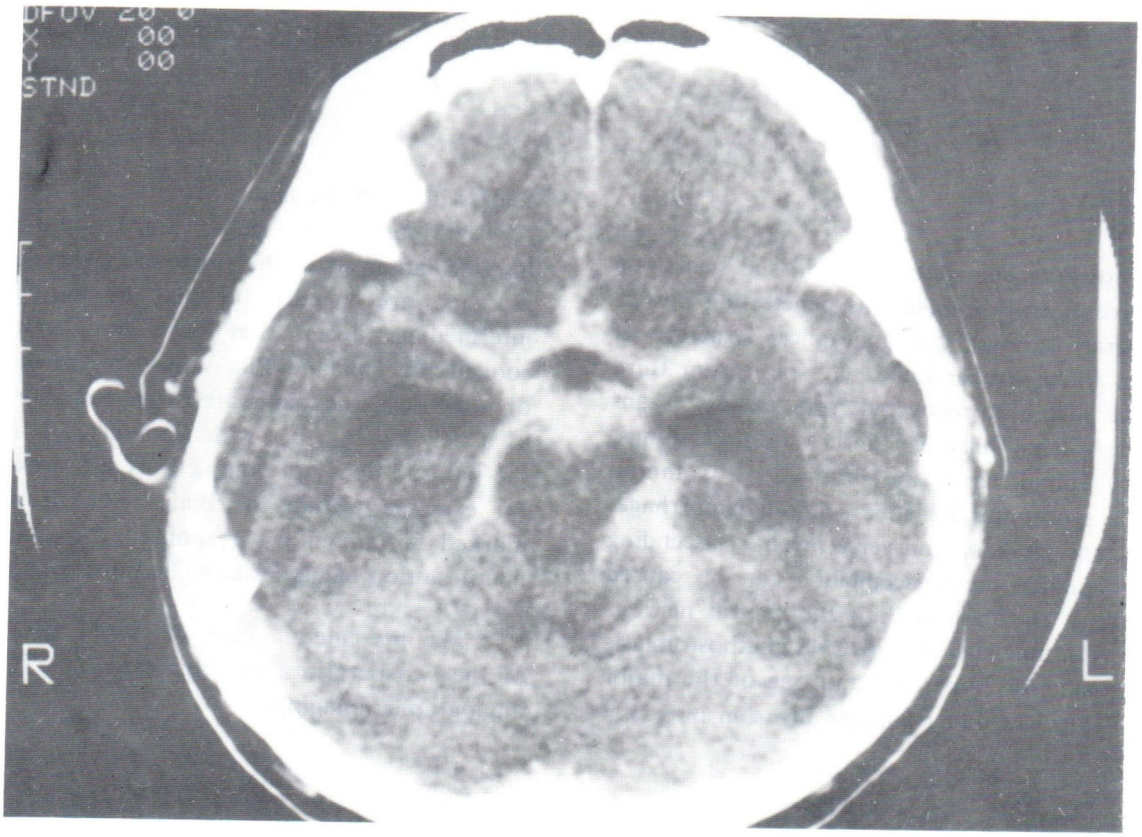
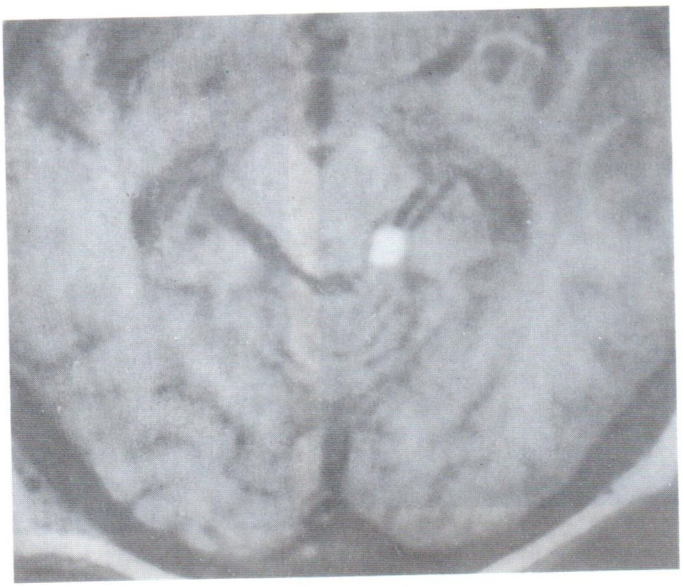
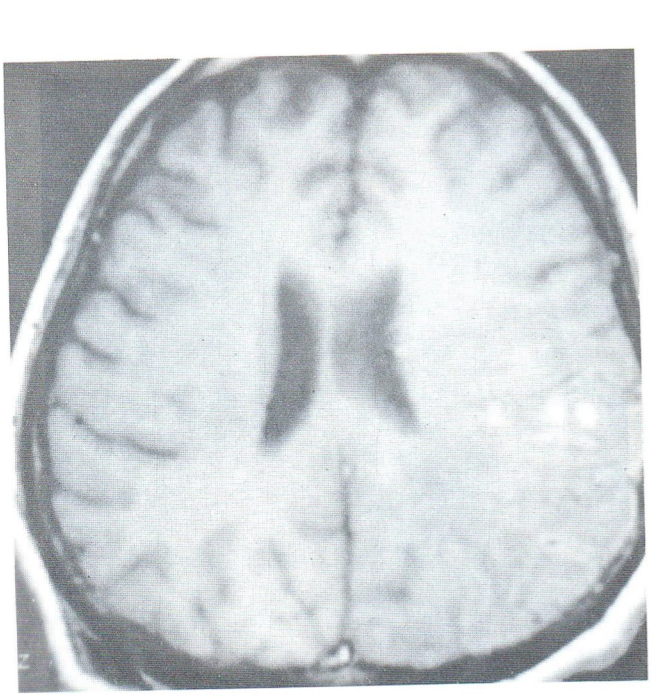


Fig. 1 Non i.v. enhanced CT scan of the brain at the cut level of the suprasellar cistern showed subarachnoid hemorrhage.





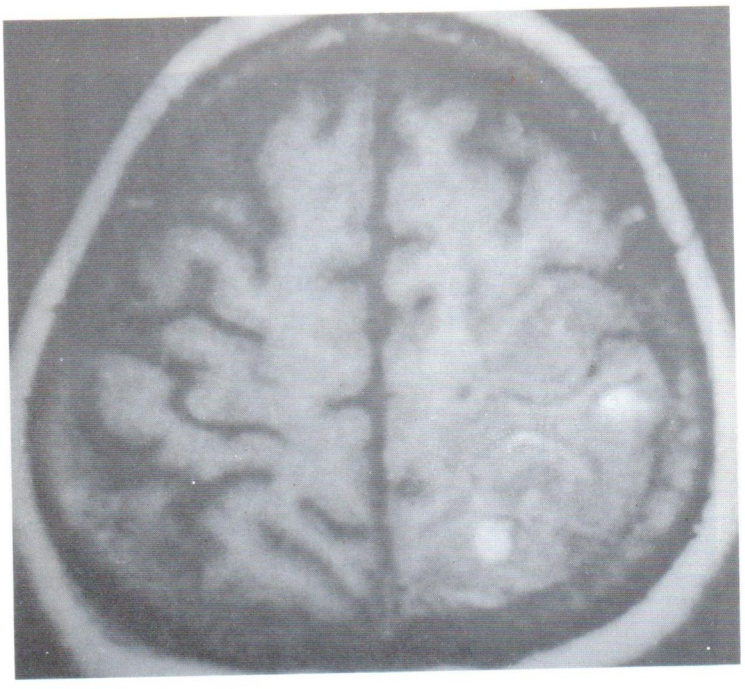


Fig. 2A T1WI-axial view MRI of the brain shows multiple small subacute hemorrhagic areas at left quadrigeminal cistern, and left parietal lobe.

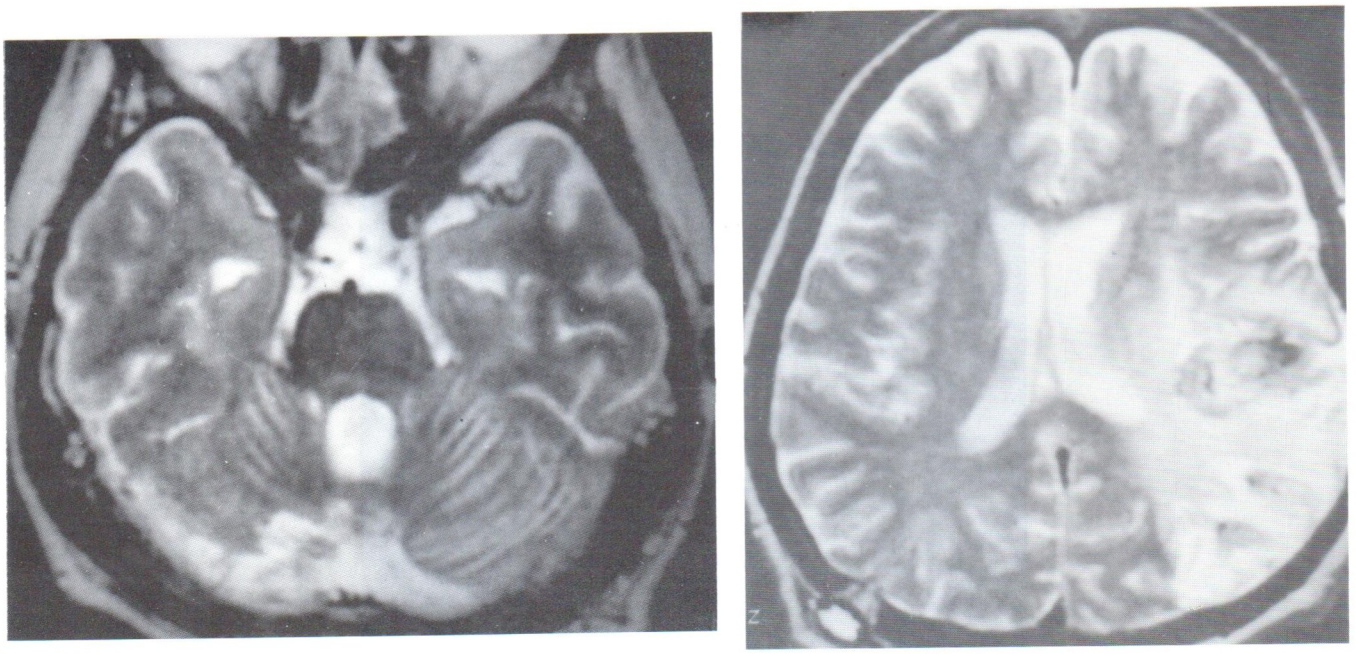


Fig. 2B T2WI-axial view MRI of the brain showed ischemic areas at postero-inferior aspect of both cerebellum and left parietal lobe, left basal ganglia with hemorrhagic component.

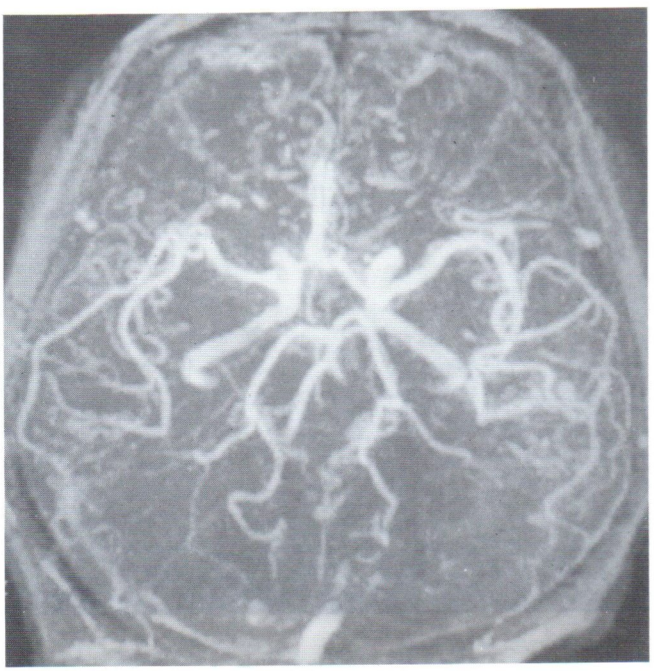


Fig. 3 MRA of the intracranial vessels showed non-visualized left vertebral artery.

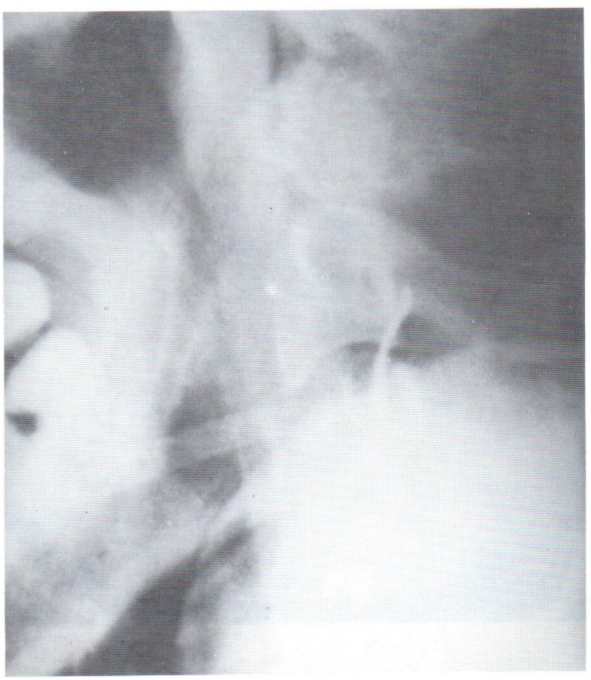


Fig. 4 Dissection of left verebral artery was seen at left vertebral angiographic injection.

DISCUSSION

The first evidence of nervous system invasion by Gnathostoma spinigerum was demonstrated by Chitanondh and Rosen in 1967 (1,5). They found a gnathostome larva embedded in the thoracocervical segment of the spinal cord of a 37-year-old Thai housewife who died of fatal esoinophilic encephalomyelitis. Adult male and female gnathostomes live in the stomach wall of definitive hosts such as the cat, dog, tiger and leopard. A G. spinigerum egg is extruded into the stomach, excreted and hatches in fresh water into the first stage larva. Three larval stages and two intermediate hosts are needed in order to complete the whole life cycle. Man is apparently an accidental host acquiring the parasite by consuming raw or inadequately cooked food which harbours G. spinigerum third stage larvae (1).

To gain access into the central nervous system, they have to go through bone openings or foramina for nerve roots, nerves, and/or blood vessels or perhaps go directly into the arterial supply system of the brain and the spinal cord. Multiple hemorrhagic tracts are the most important pathognomonic findings. These tracts may be widely distributed in the whole axis of the central nervous system or heavily concentrated in a certain segment of the nervous system such as the spinal cord in case of extensive damage, hematoma have been found in the cerebrum, cerebellum, nerve roots, and cauda equina (1,6). Massive intracerebral hematoma can be the primary cause of death (7). Secondary subarachnoid hemorrhage can either be mild, or severe with intraventricular clots (7). Microscopic examination of recent parasitic tracts reveals only hemorrhage, with none or very few cellular responses. In older lesions, microcavitation, tissue necrosis, swollen axis cylinders with phagocytosis and perivascular infiltration are seen. Cellular infiltrates may be predominantly eosinophils or other mononuclear cells, such as plasma cells, lymphocyts, and macrophages. The brain, if involved, is edematous and congested, with cellular infiltration extended to the covering meninges (1).

Paraplegia is more common than quadriplegia or triplegia. Monoplegia is also noted. The variation of weakness and sensory deficits are shown. Urinary retention is always the rule in case of radiculomyelitis of radiculomyeloencephalitis. Multiple cranial nerve palsies are noted in the encephalic form. All the cranial nerves from the second to the twelfth have been involved. Cranial nerve palsies commonly begin after paralysis of the extremities.

Five patients suffering form angiostrongyliasis were reported by Schmutzhard (2). All five presented with the signs and symptoms of meningitis, and one patient presented with bilateral abducens nerve palsy and papilledema of the left eye. No death occurred in this group.

Many helminths have been reported to be able to invade the CNS and cause a wide variety of neurological signs and symptoms. These are, besides Gnathostoma spinigerum and Angiostrongylus cantonensis, Strongyloides stercoralis (8). Trichinella spiralis (9), Toxocara canis (10), Lagochilascaris minor (11), Baylisascaris procyonis (12), Anisakis spp (13), Paragonimus westermanni (14), P. mexicanus, Schistosoma haematobium, S. japonicum, S, mansoni (15), Echinococcus granulosus (16), E multilocularis, Cysticercus cellulosae (17), Spirometra mansonoides (18).

Our presented case was the mixed infection of Gnathostoma spinigerum and Angiostrongylus cantonensis. The clinical pictures was dominated by the firstly mentioned nematode, which produced hemorrhagic incidence. The 6th nerve palsy could be seen in both parasitic infestation.

It is seldom to see the images as shown by us in this condition.

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