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INTRAMEDULLARY SPINAL NEUROCYSTICERCOSIS TREATED SUCCESSFULLY WITH MEDICAL THERAPY

By
SHAMEEM AHMED AND SIBA PROSAD PAUL
Department of Neurosurgery, Guwahati Medical College and Hospital, Guwahati (India), and Department of Neonatal Medicine, South mead Hospital, Bristol (United Kingdom)

Abstract

Neurocysticercosis caused by *Taenia solium* and is a common parasitic disease of the cental nervous system. It usually presents with seizures, headaches, progressively worsening focal neurologic symptoms, visual disturbances, loss of bladder control, etc. However, acute onset symptoms may also be seen. MRI scans can accurately diagnose spinal or cerebral lesions and is also helpful in monitoring progress while on treatment. Albendazole is currently the drug of choice along with steroids for medical management of neurocysticercosis. The case of intramedullary spinal neurocysticercosis was treated with praziquantel.
Key words: *Taenia solium,* Neurocysticercosis, MRI-scan, treatment

Introduction

Cysticercosis is a tissue infection caused by the larval stage of *Taenia solium,* the pork tapeworm (Othman *et al*, 2014). It is transmitted via the faeco-oral route either from eating undercooked pork containing tapeworm cysts or through handling of food items by infected individuals (Del Brutto 2012). Pigs serve as the intermediate hosts while humans are definite (or may be accidental intermediate) hosts. The clinical manifestations varies according to site of infection and may include seizures, headaches, focal neurologic symptoms, visual disturbances, and localized skeletal muscle (subcutaneous) nodules and pain (Kraft, 2007).

The involvement of the central nervous system (CNS) by *Taenia solium* is termed as neurocysticercosis and is of the commonest parasitic diseases of the CNS (Senthong *et al*, 2013). However, spinal involvement is rare and represents only a small proportion of all cases of neurocysticercosis; 1.2% to 5.8% (Qi *et al*, 2011).

This communication describes a young adult with intramedullary spinal neurocysticercosis who was successfully managed by medical therapy only.

Case Report: A previously healthy 24 year-old man from Northeastern India presented with progressive numbness and weakness of both lower limbs over the preceding 3 months. He also reported urinary hesitancy and feeling of incomplete bladder evacuation for the last seven days. The only history of note was that he had eaten roasted pork in a 'roadside eatery' few months earlier. He was fully conscious and oriented with a Glasgow Coma Score of 15/15. The neurological examination revealed loss of power in the lower limbs: grade 3/5 on left side and grade 4/5 on the right. Bilateral knee reflexes were found to be brisk and planter responses were extensor. Spinothalamic and posterior column sensations were decreased below thoracic spinal (T10) level. Systemic examination was otherwise normal and no subcutaneous nodules were detected.

The patient was admitted with a provisional diagnosis of neurocysticercosis and the neurosurgical consultation was requested. Other differential diagnoses such as Guillain Barré syndrome, spinal tuberculosis, infection were also considered. Laboratory investigations included full blood count, electrolytes, C-reactive protein, erythrocyte sedimentation rate, vitamin $B_{12,}$ thyroid and renal function and all were reported as normal. Magnetic resonance imaging (MRI) of the spine showed a well-demarcated intramedullary ring enhancing, cystic lesion opposite T9 vertebrae, which appeared to be hypointense on the T1WI sequence and hyperintense on T2WI sequence, with perifocal

oedema and fusiform enlargement of the cord, demonstrating hyperintense signal in FLAIR and T2W1 from T6 to T11. The cyst had an area of altered signal intensity representing scoleces. MRI screening of brain was normal. Cerebrospinal fluid analysis showed raised protein, normal glucose, lymphocytic pleocytosis and eosinophilia but no bacterial growth.

The patient was started on IV Ceftriaxone, oral praziquantel and oral dexamethasone along with physiotherapy. A week later results of cysticercal antibodies in the CSF became available (by ELISA). This confirmed the diagnosis of intramedullary spinal neurocysticercosis. Signs of improvement were noted and ceftriaxone was stopped after a week. The patient was treated with 2 weeks course of praziquantel along with 4 weeks of dexamethasone which was then gradually weaned off. The patient improved clinically, with improvement in power in lower limbs to 5/5 and sensory improvement was also noted with regained control of bladder functions. A repeat MRI scan after 5 weeks showed decrease in the size of the cystic lesion in the spine; perilesional oedema improved. He was discharged 6 months later when his symptoms have completely resolved and was given advice on food hygiene.

Discussion

This case demonstrated the need to consider intramedullary spinal neurocysticercosis in a patient presenting with progressive myelopathy with involvement of bladder and bowel functions. Cysticercosis cellulose is endemic in Mexico, Central and South America, India, and sub-Saharan Africa (White, 1997). Bruschi *et al*. (2006) described an ancient case of cysticercosis that was discovered in an Egyptian mummy of a young woman of about 20 years of age who lived in the late Ptolemaic period (second to first centuries B.C.). They added that is the oldest on record of the antiquity of this zoonotic parasite and that this observation also confirms that, in Hellenistic Egypt, the farming of swine, along with man an intermediate host of this parasite, was present, and supported the other archeological evidence. Bouree *et al*. (2006) stated that cysticercosis caused by the infection with the larva of *Taenia solium*, common throughout the world, is located in the muscles, the eyes and the central nervous system, but mostly in the brain, spinal cord infection is rare. They reported CNS cysticercosis in a French young girl who had traveled in Latin America, and complained of back pains and troublesome walking and added that only approximately 130 cases were reported in the literature, with motor and sensory disorders A review of 52 patients with neurocysticercosis in citizens from non-endemic countries who developed the disease after a travel to endemic regions, found that it was rare in international travelers to endemic countries, and most often occurred in long-term travelers (Del Brutto, 2012).

Neurocysticercosis has been anatomically classified as extraspinal (vertebral) or intraspinal (epidural, subdural, arachnoid, or intramedullary); the intramedullary type was the rarest of all (Qi *et al*, 2011). Intramedullary spinal cysticercosis is usually solitary and multilevel involvement had been described in only a few cases (Garza-Mercado, 1976).

Spinal neurocysticercosis is primarily a disease of young adults and commonly affects between the ages of 20 and 45 years. It was rare in the pediatric population, however cases as young as 5 years has been described in the literature (Homans *et al*, 2001). It usually presents with gradual onset of symptoms such as pain, paraparesis, spasticity, bowel and bladder incontinence, and sexual dysfunction (Torabi *et al*, 2004). The sudden neurological deterioration may occur in some cases due to acute inflamematory reaction (Orjuela-Rojas *et al*, 2014).

A suspicion of spinal neurocysticercosis should be followed by a thorough physical examination and cysticercal calcifications in soft tissues should be actively sought for.

These calcified lesions may be revealed by plain x-rays. Focal widening of cord shadow may be revealed by myelography or CT scan (White, 1997). MRI when available is the best diagnostic modality and will accurately identify cystic lesions in the spinal cord and will also be beneficial in identifying unusual manifestations of neurocysticercosis. The most characteristic findings on CT or MRI scan are conglomerate, multiple ring-shaped, enhancing lesions with surrounding oedema of variable degree (Othman *et al*, 2014). The MRI scan is also helpful in monitoring the response to therapy. Mazyad *et al*. (1999) stated that affection of the spinal cord with schistosome eggs, although rare but do occur, causing many neurologic complications. The resulting mass may give rise to controversy in diagnosis, which was more or less easily judged by MRI. However, radical surgical excision is not always recommended.

The best form of treatment for intramedullary spinal neurocysticercosis remains to be conclusively found (Torabi *et al*, 2004). Historically, surgery has been the treatment of choice and can eliminate the compressive element; it cannot reverse the changes due to the inflammation and edema, gliosis, vasculopathy, pachymeningitis, and syrinx formation (White 1997; Ahmad and Sharma, 2007). Anti-helminthic drugs either alone or in combination with surgery were the treatment of choice (White, 1997). A 75% satisfactory outcome after surgery and cysticidal treatment was reported in an older series (Mohanty *et al*, 1997) although the outcome following surgery was much more encouraging (Qi *et al*, 2011).

Published case reports/series has described favorable outcome with medical therapy alone. The duration of anti-helminthic and steroid therapies varied between 2 to 8 weeks (Garg and Nag, 1998; Ahmad and Sharma, 2007). Sanchetee *et al*. (1994) stated that albendazole, though acting slow, is considered a suitable alternative to praziquantel (PZQ) in medical management of parenchymal neurocysticercosis. The albendazole combined with dexamethasone is the treatment of choice (Torabi *et al*, 2004; Abba *et al*, 2010). Dexamethasone attenuated the inflammatory response associated with albendazole treatment (Torabi *et al*, 2004). Garcia *et al*. (2014) reported that the combination of albendazole plus PZQ increased the parasiticidal effect in patients with multiple brain cysticercosis cysts without increased side-effects. A more efficacious parasiticidal regime without increased treatment-associated side-effects should improve the treatment and long term prognosis of patients with neurocysticercosis. However, a Cochrane review reported insufficient evidence to assess the efficacy of PZQ (Abba *et al*, 2010); this may be due to limited use of PZQ as it is not licensed for human use in many countries due to its severe side effects on schistosomiasis infected Egyptian children (El-Hawey *et al*, 1990). Erko *et al*. (2012) found relatively lower cure and egg reduction rates of the PZQ evaluated as compared to previous reports for other PZQ brands in Ethiopia. Tonkal and Morsy (2008) gave a review on *Commiphora molmol* and related species as an antihelminthic herbal drug. Basyoni and El-Sabaa (2013) reported that Myrrh was effective and could be a promising drug against the Egyptian strains of *T. spiralis* (tissue helminthic infection) with results nearly comparable to the ivermectin. Wu *et al.* (2014) stated that pharmacological therapy for urolithiasis using the medicinal plants as the two herbal drugs *C. molmol* and *Natrii sulfahas*, have been increasingly adopted for the prevention of its recurrence

Conclusions

The intramedullary spinal neurocysticercosis should be considered in a patient from an endemic area presenting with gradual onset myelopathy. With the advent of better neuroimaging techniques and better characterization of features of spinal neurocysticercosis, most patients are likely to be diagnosed early and treated medically, thus obviating the need for surgery in a large proportion of

cases. Albendazole is the anti-helminthic of choice. Response to the medical therapy and anatomical resolution can be monitored by serial MRI scans.

References

Abba, K, Ramaratnam, S, Ranganathan, LN, 2010: Anthelmintics for people with neurocysticercosis. Cochrane Database Syst Rev. (3):CD0 00215. doi: 10.1002/14651858.CD000215. pub4

Ahmad, FU, Sharma, BS, 2007: Treatment of intramedullary spinal cysticercosis: Report of 2 cases and review of literature. Surg. Neurol. 67, 1:74-7.

Basyoni, MM, El-Sabaa, AA, 2013: Therapeutic potential of myrrh and ivermectin against experimental *Trichinella spiralis* infection in mice. Korean J. Parasitol. 51, 3:297-304.

Bouree, P, Dumazedier, D, Bisaro, F, Resende, P, Comoy, J, *et al*, 2006: Spinal cord cysticercosis: a case report. J. Egypt. Soc. Parasitol 36, 3: 727-36.

Bruschi, F, Masetti, M, Locci, MT, Ciranni, R, Fornaciari, G, 2006: Short report: cysticercosis in an Egyptian mummy of the late Ptolemaic period. Am. J. Trop. Med. Hyg. 74, 4:598-9.

Del Brutto, OH, 2012: Neurocysticercosis among international travelers to disease-endemic areas. J. Travel Med. 19, 2:112-7.

el-Hawey, AM, Massoud, AM, el-Rakieby, A, Rozeik, MS, Nassar, MO, 1990: Side effects of praziquantel in bilharzial children on a field level. J. Egypt. Soc. Parasitol. 20, 2:599-605.

Erko, B, Degarege, A, Tadesse, K, Mathiwos, A, Legesse, M, 2012: Efficacy and side effects of praziquantel in the treatment of *Schistosoma mansoni* in schoolchildren in Shesha Kekele Elementary School, Wondo Genet, Southern Ethiopia. Asian Pac. J. Trop. Biomed. 2, 3:235-9

Garcia, HH, Gonzales, I, Lescano, AG, Bustos, JA, Zimic, M, 2014: Efficacy of combined antiparasitic therapy with praziquantel and albendazole for neurocysticercosis: a double-blind, randomized controlled trial. Lancet Infect. Dis. 14, 8:687-95.

Garg, RK, Nag, D, 1998: Intramedullary spinal cysticercosis: response to albendazole: case reports and review of literature. Spinal Cord 36, 1:67-70.

Garza-Mercado, R, 1976: Intramedullary cysticercosis. Surg Neurol. 5, 6:331-2.

Homans, J, Khoo, L, Chen, T, *et al*, 2001: Spinal intramedullary cysticercosis in a five-year-old child: case report and review of the literature. Pediatr. Infect. Dis. J. 20, 9:904-8.

Kraft, R, 2007: Cysticercosis: an emerging parasitic disease. Am. Fam. Physician 76, 1:91-6.

Mazyad, MA, Mostafa, MM, Morsy, TA, 1999: Spinal cord schistosomiasis and neurologic complications. J. Egypt. Soc. Parasitol. 29, 1:179-82.

Mohanty, A, Venkatrama, SK, Das, S, 1997: Spinal intramedullary cysticercosis. Neuro-surg. 40, 1:82-7.

Orjuela-Rojas, JM, Ramírez-Bermúdez, J, Martínez-Juárez, IE, Kerik, NE, Diaz Meneses, I, *et al*, 2014: Visual hallucinations of autobiographic memory and asomatognosia: a case of epilepsy due to brain cysticercosis. Neuro case. 2014 Oct 10:1-7. [Epub ahead of print]

Othman, AA, Bruschi, F, Ganna, AA, 2014: Helminth parasitic infections of the central nervous system: A diagnostic approach. J. Egypt. Soc. Parasitol. 44, 1:55-70

Qi, B, Ge, P, Yang, H, Bi, C, Li, Y, 2011: Spinal intramedullary cysticercosis: a case report and literature review. Int. J. Med. Sci. 8, 5:420-3

Sanchetee, PC, Venkataraman, S, Dhamija, R, Roy, A, 1994: Albendazole therapy for neuro-cysticercosis. J. Assoc. Physicians India 42, 2:116-7.

Senthong, V, Chindaprasirt, J, Sawanyawisuth, K, 2013: Differential diagnosis of CNS angiostrongyliasis: a short review. Hawaii. J. Med. Publ. Hlth. 72, 6:S52-4

Tonkal, AM, Morsy, TA, 2008: An update review on *Commiphora molmol* and related species. J. Egypt. Soc. Parasitol. 38, 3:763-96

Torabi, AM, Quiceno, M, Mendelsohn, DB, Powell, CM, 2004: Multilevel intramedullary spinal neurocysticercosis with eosinophilic meningitis. Arch. Neurol. 61, 5:770-2.

White, AC Jr, 1997: Neurocysticercosis: a major cause of neurological disease worldwide. Clin. Infect. Dis. 24, 2:101-13; quiz 114-5.

Wu, SY, Shen, JL, Man, KM, Lee, YJ, Chen, HY, *et al*, 2014: An emerging translational model to screen potential medicinal plants for nephrolithiasis, an independent risk factor for chronic kidney disease. Evid. Based Complement. Alter. Med. 2014:972958. doi:10.1155/2014/972958.