Brief Communication

Cysticercosis: Unearthing the worm

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Abstract

Cysticercosis, a helminthic disease caused by *T. Solium*, is a major health concern in developing and underdeveloped nations of the world. If left untreated, it may lead to severe neurological and ophthalmic complications. The diagnosis of oral cysticercosis depends on the identification of the larva in the biopsied tissue. However, an accurate diagnosis can be challenging, if the larva is dead because of which it cannot be identified. In such a scenario, step by step approach to unearth the worm is discussed here.

Keywords: Cysticercosis, neurocysticercosis, oncosphere

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INTRODUCTION

Cysticercosis (CC) is a helminthic disease that involves the host of two different species and is caused by the metacestodes of *Taenia solium* which is placed in the order of Cyclophyllidea. The term cysticercosis was coined by Laennec and is derived from two Greek words 'Kystic' meaning bladder and 'kercos' which describes tail. Rudolphi, due to its high affinity for connective tissue proposed the second name 'cellulose' in 1809.[1]

LIFE CYCLE AND HUMAN INFESTATION

T. solium has a two-host cycle with pig and human beings as the intermediate host, providing the niche to the larvae of cystercerci to survive while human beings are the sole definitive host which foster the adult tapeworm.[2] The parasite infection spreads through the oro-faecal route by ingesting the food infested with the eggs of the organism. Consumption of infected under-cooked pork is the major cause of CC, while the reasons for its occurrence in the vegetarians can be attributed to eating raw vegetables irrigated with infected water source or drinking infected water. Cases of auto-inoculation have been seen in patients with poor hygienic practices, or eggs can be regurgitated into the stomach.[3]

EPIDEMIOLOGY

CC is most prevalent in less developed countries of the world with endemic areas limited to the Latin America, sub-Saharan Africa and Southeast Asia.[4] Bihar, Orissa, Uttar Pradesh and Punjab are the Indian states with the maximum concentration of the cases.[5] After ingestion, the oncospheres hatch and penetrate into the intestine from where they migrate to musculature. Subcutaneous tissue is the most common affected organ followed by muscles,

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brain, eyes and liver. Neurocysticercosis and ophthalmic cysticercosis are some serious complications of this parasitic infection.[6]

ORAL MANIFESTATION

Oral involvement is rare but if involved, muscles of mastication, tongue, lips and buccal mucosa have higher predilection. The lesion can present as an asymptomatic nodule, lump or swelling. Association with pain can be seen in cases of secondary infection.[3] The treatment includes surgical enucleation for solitary lesions and potent anti-helminthics like praziquantel and albendazole can be used for symptomatic or disseminated cases or where surgical intervention is risky or not possible, e.g., Neurocysticercosis.[2]

HISTOPATHOLOGY

Gross examination of the specimen shows a cystic mass. On dissection, it will reveal a clear watery fluid and a coiled white structure which will be attached to the inner side of the cystic wall. The histopathological examination of the parasitic larvae [Figure 1a and 1b] will show dense fibrous outer capsule which is formed from the host body reaction. Therefore, it is comprised of dense inflammatory cell infiltrate composed predominantly of lymphocytes, plasma cells and macrophages on the outer aspect, while the inner aspect is composed of dense aggregates of eosinophils and neutrophils. Occasionally, dystrophic calcification in the form of concentric lamellae can be seen in focal areas. A delicate double-layered membrane is present inside the fibrous capsule and is loosely attached to it, and can be torn away easily. This membrane is comprised of two layers: an outer acellular hyaline eosinophilic layer and an inner scanty cellular layer. The cyst containing the larva of *T. Solium* lies within this membrane. The scolex with rostellum, suckers [Figure 2a and 2b] and hooks [Figure 2c and 2d] can be identified on the cephalic end. Duct-like invagination segment lined by homogenised anhistic membrane can be noted caudally to the scolex.[7]

CHALLENGES IN DIAGNOSIS

Death of the larva can occur due to the body's protective mechanism and is presented as granulomatous reaction around the dead parasite in the biopsy tissue. Also, cases have been reported with cystic lesions in skeletal muscles on MRI scans but a larva cannot be identified in a biopsy tissue [Figure 3]. Histopathological examination of such cases reveals aggregates of palisaded histiocytes, eosinophils, plasma cells and foreign body giant cells in the affected muscle tissue.

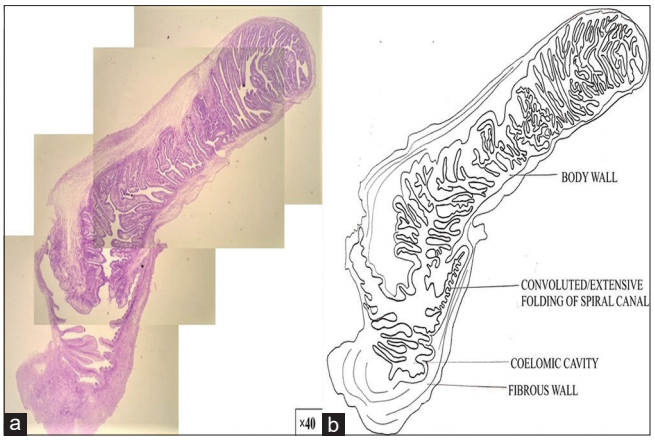

Figure 1: (a) Photomicrographs showing PAS-stained section of viable larva of *T. solium* in a double-layered fibrous capsule wall (×40). (b) Hand-drawn illustration of larva of *T. solium* in longitudinal section

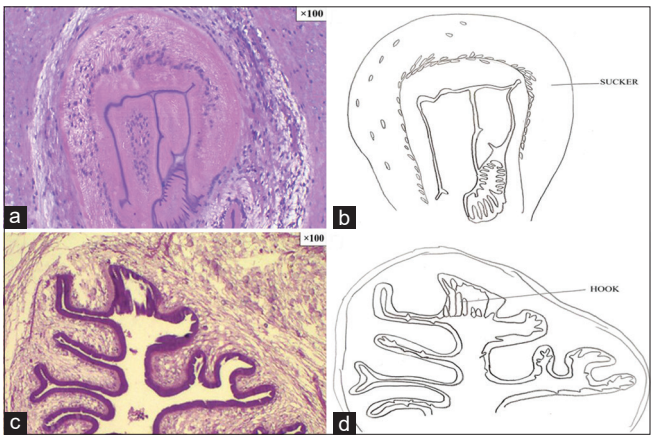

Figure 2: (a) Photomicrographs showing H and E-stained section of cephalic part of the larva of *T. solium* (×100). (b) Hand-drawn illustration of cephalic part of the larva showing the suckers. (c) Photomicrographs showing PAS-stained section of the larva exhibiting hooks in the cephalic part (×100). (d) Hand-drawn illustration of hooks in the cephalic part of larva

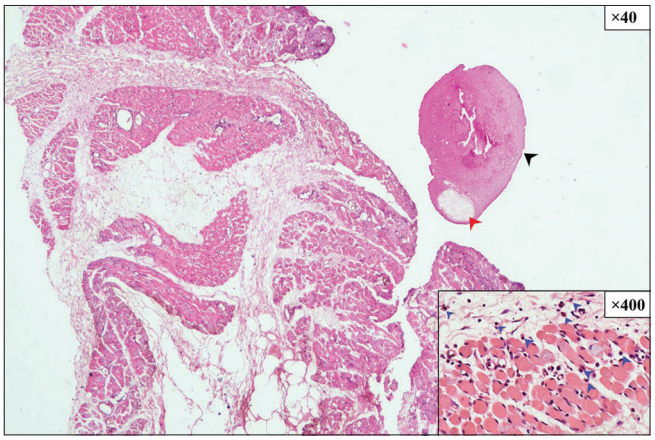

Figure 3: Photomicrographs showing H and E-stained section with dead larva (black arrow head) with gelatinous material at one end (red arrow head) within muscle (×40). Inset showing numerous eosinophils (blue arrow head) infiltrating the muscles (×400)

In such a scenario, a diagnosis of parasitic cystic lesion should be rendered and the parasite should be identified after serological tests. These tests immunologically identify the presence of cysticercus in serum, cerebrospinal fluid and saliva. Enzyme-linked immunosorbent assay (ELISA) or enzyme-linked immunoelectrotransfer Blot (EITB) are the serological tests used for this purpose.[3] Additionally, stool examination can also reveal the presence of eggs and/or proglottids of cysticercosis cellulosae.[2] Hence, the diagnosis of cysticercosis can be challenging, if the larva cannot be identified in the tissue sections.

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Conflicts of interest

There are no conflicts of interest.

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