TAENIA SOLIUM CYSTICERCOSIS: A STUDY OF THIRTY TWO CASES AT UNUSUAL AND RARE SITES

Abstract:

Introduction: Cysticercosis is one of the most common parasitic infestations in humans. Neurocysticercosis is the commonest parasitosis of the central nervous system. This article highlights the infestation of this common parasite at rare sites with unusual presentation.

Materials and methods: Thirty-two cases of Cysticercosis with unusual presentation at rare sites received within a period of 4 years at the Department of Pathology in a tertiary care hospital are discussed. Formalin fixed tissue sections were stained with hematoxylin and eosin. Histopathological diagnosis for all the cases was Cysticercus cellulosae.

Results: Twenty five cases were of subcutaneous tissue of chest wall, breast, lumbar region, umbilicus, abdominal wall, back, extremities, and neck region, 4 cases were of medial canthus of eye, and 3 cases were of oral cavity. The most common site was chest wall 8 (25%) cases and the second most common sites were eye medial canthus and lumbar region 4 (12.5%) cases each. Majority of the cases were in the age group of 11-20 years 10 (31.25%) and second most common age group was 21-30 years 7 (21.87%). Out of total 32 cases 22 (68.75%) cases were females and 10 (31.25%) cases were males.

Conclusion: Diagnosis of Cysticercosis though common in central nervous system, it should also be kept as a differential diagnosis even for the swellings at unusual sites in the endemic areas of Taeniasis infection.

Key words: Cysticercosis; Oral cavity; Medial canthus of eye; Subcutaneous tissue.
Introduction

Cysticercosis is a serious public health problem in several developing countries.  It is estimated that 50 million people worldwide are infected with the taeniasis/ cysticercosis complex and 50,000 die from cysticercosis annually. Most infected individuals are aged between 20–50 years and debilitating from cysticercosis represents a financial blow, with human suffering.

Taenia solium has a complex two host life cycle. Humans are the only definitive hosts and harbour the adult tapeworm (taeniasis) and pigs are the intermediate host. Both humans and pigs can act as intermediate hosts and harbour the larvae or cysticerci.

In cysticercosis, humans become the intermediate host by ingesting the infective eggs of Taenia solium from contaminated food and water and replace the pig as intermediate host. Humans are the only host for the adult tapeworm and thus the only source of cysticercosis for pigs or other humans.

After entering the intestinal wall, the embryo invade the blood stream and can lodge in various organs such as the central nervous system, eye, skeletal muscles, and subcutaneous tissue.

Materials and methods

Thirty-two cases of Cysticercosis with unusual presentation at rare sites received within a period of 4 years at the Department of Pathology in a tertiary care hospital are discussed. In all the 32 cases, formalin fixed tissue sections were stained with hematoxylin and eosin.

Results

Thirty-two cases of Cysticercosis are presented in this study. Twenty five cases were of subcutaneous tissue of chest wall, breast, lumbar region, umbilicus, abdominal wall, back, extremities, and neck region, 4 cases were of medial canthus of eye, and 3 cases were of oral cavity. The common site was chest wall 8 (25%) cases and the second most common sites were eye medial canthus and lumbar region 4 (12.5%) cases each. Majority of the cases were in the age group of 11-20 years 10 (31.25%) and second most common age group was 21-30 years 7 (21.87%). The total number of cysts can range from a solitary lesion to several hundred. On review of all documented cases of ocular cysticercosis, it was found that 35% of the cysts were reported in subretinal space, and 22% in vitreous. Cysticerci can lodge themselves in any part of the ocular and extraocular tissues and associated brain parenchyma involvement is also quite rare. Pushker et al. studied 20 patients with ocular and extraocular cysticercosis, of whom only 2 (10%) had associated cysts in the brain parenchyma. In our study, the 4 cases of medial canthus eye swelling, central nervous system involvement was ruled out. Skeletal muscle or subcutaneous cysticercosis can cause localized pain and nodules. Cysticercosis may cause cystic swellings or nodules in mouth, and these may be the only evidence of disease, as was seen in our 3 cases of oral cavity. Subcutaneous lesions can help in diagnosis of neurocysticercosis.

Discussion

Human cysticercosis is ubiquitous worldwide where consumption of semi- or improperly cooked pork, contaminated salad, and inadequate hygiene are all possible causes of taeniasis and thereby can cause autoinfection. Food habits, poor hygiene, autoinfection, or travelling patterns may be responsible for their distribution.

The clinical features of cysticercosis vary with the number, size, location and stage of cysticercosis as well as the intensity of the host’s immune response. Ocular involvements include cysts in eyelids, extraocular muscles, orbit, conjunctiva, anterior chamber, uvea, retina–vitreous, and optic nerve. Brain and eye cysts cause the most morbidity, with the brain being most common location for cysts (60–90% of all cases) and eye being the least common (1-3%).
contamination with Taenia solium eggs from tapeworm carriers. Thus, vegetarians and other people who do not eat pork can also acquire cysticercosis. Although cysticercosis has been known for ages, its relation to the adult tapeworm was not clear until it was shown by Kuchenmaister in 1855; he fed condemned prisoners with cysticercosis-infected pork and recovered young tapeworms at autopsy. The larvae evaginate in the small intestine; the head (scolex) attaches to the mucosa and begins forming intestine; the head (scolex) attaches to the mucosa and begins forming segments (proglottids). Taenia solium has a scolex with four suckers and a double crown of hooks, a narrow neck, and a large strobila measuring 2–4 mm and consisting of several hundred proglottids. About 2 months after infection, gravid proglottids begin to detach from the distal end and are excreted in the faeces; each segment contains 50–60×10^3 fertile eggs. The tapeworm attaches strongly to the mucosa of the upper small intestine by its suckers and hooks. The adult tapeworm causes only mild inflammation at the implantation site. Abdominal pain, distension, diarrhoea, and nausea are documented, but most patients seem to be free of symptoms. Viable Taenia solium cysts often do not produce symptoms and can evade host immune defences by producing taeniaestatin and paramyosin, which seem to inhibit complement activation.

Carriers of Taenia solium will neither look for medical care nor notice the tapeworm segments in their stools. Conversely, patients infected with Taenia saginata notice passage of numerous, motile proglottids, larger than those of Taenia solium. Identification of Taenia solium is important because of the risk of cysticercosis in the carrier or the immediate environment. The tapeworm carrier can be found in the patient’s household. Stool examination has poor sensitivity but screening of the patient and household members is recommended so that sources of infection can be detected and eliminated.

The lifespan of the adult Taenia solium is unknown. Parasitology textbooks and reviews cite the lifespan as 20–25 years. Some studies suggest it to be probably less than 5 years.

The invasive oncospheres (embryos) in the eggs are liberated by the action of gastric acid and intestinal fluids and cross the bowel wall, enter the bloodstream, and are carried to the muscles and other tissues. At small terminal vessels, they establish and encyst as cysticerci, reaching their definitive size of about 1 cm in 2–3 months.

Extraneural cysticercosis causes no major symptoms. Subcutaneous cysticercosis presents as small, movable, painless nodules commonly noticed over the arms or chest. After a few months or even years, the nodules become swollen, tender, and inflamed, and gradually disappear. The present study includes 25 cases of subcutaneous nodule over the chest wall, breast, lumbar region, umbilicus, paraumbilical region, abdominal wall, back, extremities, and neck region, 4 cases were of medial canthus of eye, and 3 cases were of oral cavity. Subcutaneous cysticercosis is common in Asia and Africa. Biopsy or fine-needle cytology of subcutaneous nodule helps to confirm the diagnosis of cysticercosis.

Ophthalmic cysticercosis is less common than neurocysticercosis (1–3% of all infections), Taenia solium is the most common infraorbital parasite. The ocular manifestations can be destructive because the cysticercus gradually increases in size, leading to blindness in 3 to 5 years. The death of the parasite causes release of toxins, leading to intense inflammatory reactions and eye damage. In our ocular cases there was no history of affection of vision.

Diagnosis

Two problems hamper the diagnosis of infection with Taenia solium: the poor sensitivity of stool microscopy, and morphological similarity between the eggs of Taenia solium and Taenia saginata. Haematoxylin-eosin staining of histological sections of proglottids can help. Visualisation of taenia eggs by microscopy was the only diagnostic method available until early 1990s. Perianal scraping with adhesive tape (Graham’s test) is highly sensitive for Taenia saginata but not for Taenia solium. Coproantigen detection ELISA is a good tool for taenia-specific molecules in faecal samples with sensitivity of 95% and specificity of 99%. It confirmed that microscopy was poorly sensitive, missing 60–70% of cases. DNA-based assays to discriminate Taenia solium from Taenia saginata infections, and a serological assay for specific identification of tapeworm carriers have been described.

The most commonly used ELISA cross-reacts with Hymenolepis nana and Echinococcus granulosus, which are common cestode infections. The enzyme-linked immunoblot assay has sensitivity of 98% and specificity of 100%, and is better than ELISA. Biopsy of brain, skin, or muscle provides a definitive diagnosis.

Serologic diagnosis

Advances in serologic diagnosis include the identification and synthesis of specific antigens to obtain consistent
Antibody assays for cysticercosis

The Western blot for cysticercosis or the enzyme-linked immunoelectrodiffusion transfer blot (EITB), which uses lentil lectin purified glycoprotein (LLGP) antigens extracted from the metacestode of Taenia solium, has been the “gold standard” serodiagnostic assay since it was first described in 1989. GP50, a Taenia solium protein diagnostic for cysticercosis has been cloned, sequenced, and characterized. It is another diagnostic component of the LLGP antigens that has been used for antibody-based diagnosis of cysticercosis with the EITB assay. GP50 is a glycosylated and glycosylphosphatidylinositol-anchored membrane protein. GP50 purified from cysticerci has two homologs expressed in the adult worm: T. solium excretory/secretory (TSES) and TSES. Both are diagnostic for taeniasis.

A preliminary evaluation of recombinant GP50 (rGP50) in the EITB assay showed a specificity of 100% for cysticercosis and a sensitivity of 90% for cysticercosis-positive serum samples reactive with the GP50 component of LLGP.6

Antigen-detection assays for cysticercosis

Detection of circulating parasite antigen reflects the presence of live parasites, establishes the presence of ongoing viable infection in the absence of definitive radiologic features.6

Antibody assays for taeniasis

Humans can be infected with either the tapeworm and/or the larval form of T. solium, resulting in taeniasis or cysticercosis, respectively. The diagnosis and treatment of taeniasis is particularly important because this stage of the parasite produces large numbers of infective ova that after ingestion result in cysticercosis in humans and pigs. Treatment and elimination of tapeworms in carriers would eventually result in eradication of cysticercosis.6

Antigen-detection assays for taeniasis

TABLE 1: Anatomical distribution of lesions in patients (n=32)

<table>
<thead>
<tr>
<th>Site</th>
<th>Number Of Cases</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye – Medial canthus (Right: 3; Left: 1)</td>
<td>4</td>
<td>12.5</td>
</tr>
<tr>
<td>Oral cavity</td>
<td>3</td>
<td>9.37</td>
</tr>
<tr>
<td>Neck [Cervical (Right):2; Submental: 1]</td>
<td>3</td>
<td>9.37</td>
</tr>
<tr>
<td>Shoulder (Right:2 &amp; Left:1)</td>
<td>3</td>
<td>9.37</td>
</tr>
<tr>
<td>Chest wall (Right: 5 &amp; Left:3)</td>
<td>8</td>
<td>25</td>
</tr>
<tr>
<td>Breast (Right)</td>
<td>1</td>
<td>3.12</td>
</tr>
<tr>
<td>Anterior abdominal wall</td>
<td>2</td>
<td>6.25</td>
</tr>
<tr>
<td>Umbilicus</td>
<td>1</td>
<td>3.12</td>
</tr>
<tr>
<td>Paraumbilical (Right)</td>
<td>1</td>
<td>3.12</td>
</tr>
<tr>
<td>Lumbar region (Right: 3 &amp; Left:1)</td>
<td>4</td>
<td>12.5</td>
</tr>
<tr>
<td>Thigh (Right medial: 1; Left lateral: 1)</td>
<td>2</td>
<td>6.25</td>
</tr>
<tr>
<td>TOTAL</td>
<td>32</td>
<td>100</td>
</tr>
</tbody>
</table>

TABLE 2: Age distribution of lesions in patients (n=32)

<table>
<thead>
<tr>
<th>Age In Years</th>
<th>Number Of Cases</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>5</td>
<td>15.62</td>
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<tr>
<td>11-20</td>
<td>10</td>
<td>31.25</td>
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<tr>
<td>21-30</td>
<td>7</td>
<td>21.87</td>
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<td>31-40</td>
<td>5</td>
<td>15.62</td>
</tr>
<tr>
<td>41-50</td>
<td>3</td>
<td>9.37</td>
</tr>
<tr>
<td>51-60</td>
<td>2</td>
<td>6.25</td>
</tr>
</tbody>
</table>

Conclusion

Cysticercosis though common in central nervous system, it can also be found in the rare sites like the eye, skeletal muscles, and subcutaneous tissue, as seen in our study. We had cases of cysticercosis in the oral cavity, eye and subcutaneous tissue. Cysticercosis is much more common in our part of the world than usually thought. Hence the possibility of cysticercosis should be kept in consideration in all inflammatory/cystic/inflammatory cystic lesions.
Cysticercosis should also be kept as differential diagnosis even for the swellings at unusual sites such as the oral cavity, ocular and subcutaneous tissue in the endemic areas of Taeniasis infection.

References


