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Research Article

Fine needle aspiration cytology of subcutaneous cysticercosis: a study of 16 cases

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ABSTRACT

Background: Cysticercosis is an important parasitic infection more prevalent in developing countries. Fine needle aspiration cytology (FNAC) is an easy, low cost and fairly accurate method in diagnosing the disease. The main objective is to study the clinico-cytological profile of patients diagnosed with cysticercosis cellulosae.
Methods: The present study was descriptive observational cross sectional study done over a period of four years during which FNAC was done in patients presenting with subcutaneous and intramuscular nodules at various sites. After detailed clinical history and clinical examination, the character of aspirate was noted. In each case, three alcohol fixed smears were prepared, first smear was stained with Papanicolaou stain, second with Giemsa stain and third one was kept unstained for any further required stain. Subsequent excision biopsy was also performed in patients suspected to have cysticercosis.
Results: A total of 16 cases of cysticercosis were diagnosed on FNAC and subsequently confirmed by excision biopsy over a four year period. Out of the 16 cases 11 (68.7%) were females and 5 (31.3%) were males. The mean age at diagnosis was 24 years. Most common site of involvement was upper extremity followed by neck. In most cases provisional clinical diagnosis was lipoma. In 10 cases out of 16 cases, actual parasitic structures were demonstrated. Only one case showed presence of hooklet. 5 cases showed presence of only acellular granular material with no parasite. The background population in most of the cases were predominantly eosinophils, lymphocytes, neutrophils with multinucleated giant cells in some cases.
Conclusions: The high accuracy coupled with low cost and quick results make FNAC an important outpatient procedure for diagnosis of cysticercosis. In any soft tissue nodular swelling, possibility of cysticercosis must be kept in mind, especially in endemic areas.

Keywords: Cysticercosis, Fine needle aspiration cytology, Subcutaneous nodules, *Taenia solium*

INTRODUCTION

Cysticercosis is a tissue infection, caused by cysticercus cellulosae, larval form of *Taenia solium* (Tapeworm). It occurs in humans due to ingestion of tapeworm eggs by contaminated uncooked food/water or through self-infection via faeco-oral route.[1] It is a potentially dangerous systemic disease with predilection for skeletal muscle, central nervous system and subcutaneous tissue. Clinically, it may be mistaken for lipoma or neurofibroma. The prevalence of the disease is high in India being a developing country with a large population living below poverty line. It is generally believed that the disease is more prevalent in North than South India.[2] Humans are the definitive hosts for *T. solium*; pigs are the usual intermediate hosts, although dogs, cats and sheep may harbor the larval forms comprising of three layered wall vesicle and scolex.[3] The preoperative diagnosis of

cysticercosis can be made by various radiological modalities (CT scan, MRI) or serological tests (complement fixation test, ELISA), both of which are not definitive. Fine needle aspiration cytology (FNAC) can be used as an easily available, cost effective preoperative tool for diagnosis of soft tissue cysticercosis. The diagnosis is confirmed by histopathological examination of the specimen which shows presence of cysticercus larvae with surrounding inflammation.[4] Cysticercosis is a diagnostic and therapeutic dilemma for clinicians. In this study we aim to analyze the cytomorphological spectrum of cysticercosis and stress on the importance of FNAC as a rapid, easy and fairly accurate technique for diagnosing the disease.

METHODS

The present study was descriptive observational cross sectional study done over a period of four years during which FNAC was done in patients presenting with palpable subcutaneous and intramuscular nodules at various sites refered from various departments to the cytology section of Government Medical College and Government Hospital Gandhi Nagar Jammu. Detailed history and relevant clinical examination was done in all cases. FNAC was performed using 22 gauge needle and 10 ml plastic disposable syringe with a detachable syringe holder (Franzen Handle). The character of aspirate was noted. In each case, three alcohol fixed smears were prepared, first smear was stained with Papanicolaou stain, second with Giemsa stain and third one was kept unstained for any further required stain. Ziehl Neelson (ZN) stain was done in cases clinically suspected as tubercular lymphadenitis. Subsequent excision biopsy was also performed in patients suspected to have cysticercosis.

RESULTS

A total of 16 cases of cysticercosis were diagnosed on FNAC and subsequently confirmed by excision biopsy over a four year period.

The age range of patients was 8 to 59 years. The mean age at diagnosis was 24 years. Out of the 16 cases 11 (68.7%) were females and 5 (31.3%) were males. The most common site of involvement was upper extremity (07) followed by neck (03), abdominal wall (03), chest wall (01), calf (01) and back (01). Maximum number of cases presented as single nodule (14) with only 02 cases presenting as multiple nodules, both on anterior abdominal wall. In only one case, cysticercosis was the clinical diagnosis. In all other cases provisional diagnosis was lipoma (06), neurofibroma (03), tubercular lymphadenitis (02), benign tumor (02), reactive lymphadenitis (01) or inclusion cyst (01). In most of the cases (14) aspiration yielded clear fluid. 15 (93.7%) patients were non-vegetarian and only one patient was vegetarian at the time of study but she too had a past history of intake of non-vegetarian diet (Table 1).

Table 1: Presentation of 16 diagnosed cases of cysticercosis.

Case no.	Age (in years)	Sex	Site	Presentation	Clinical diagnosis
1	15	M	Left arm	Single	Lipoma
2	23	F	Neck	Single	Tubercular lymphadenitis
3	12	F	Right forearm	Single	Lipoma
4	31	M	Abdominal wall	Multiple	Lipoma
5	20	F	Left forearm	Single	Neurofibroma
6	22	F	Neck	Multiple	Reactive lymphadenitis
7	44	F	Calf muscle	Single	Benign tumour
8	18	F	Right arm	Single	Cysticercosis
9	25	M	Right chest wall	Single	Benign tumour
10	08	F	Right arm	Single	Neurofibroma
11	36	M	Back	Single	Epidermal inclusion cyst
12	10	F	Abdominal wall	Single	Lipoma
13	59	F	Neck	Single	Tubercular lymphadenitis
14	33	M	Left arm	Single	Lipoma
15	16	F	Abdominal wall	Multiple	Lipoma
16	12	F	Right shoulder	Single	Neurofibroma

Cytomorphologically, actual parasitic structures were demonstrated in 10 cases only. One case showed presence of hooklet (Figure 1). 05 cases showed presence of only acellular granular material with no parasite (Figure 2). The background population in most of the cases predominantly comprised of eosinophils, lymphocytes, neutrophils with multinucleated giant cells in some cases. The section of larvae showed prominent cuticular layer with hooklets and surrounding inflammation (Figure 3). ZN stain was noncontributory

in suspected cases of tubercular lymphadenitis. All the cases were subjected to excisional biopsy. The histopathological examination confirmed the diagnosis of cysticercosis in all cases with 100% accuracy.

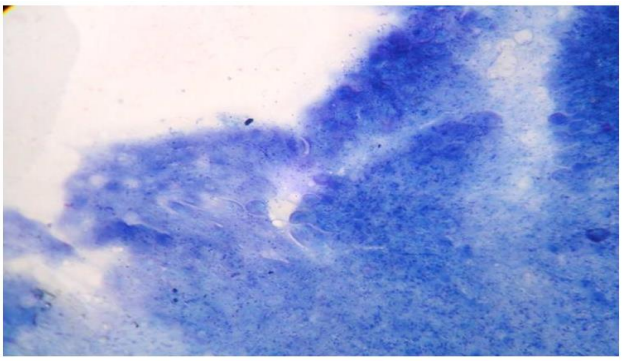

Figure 1: Microphotograph showing presence of scolex along with hooklet.

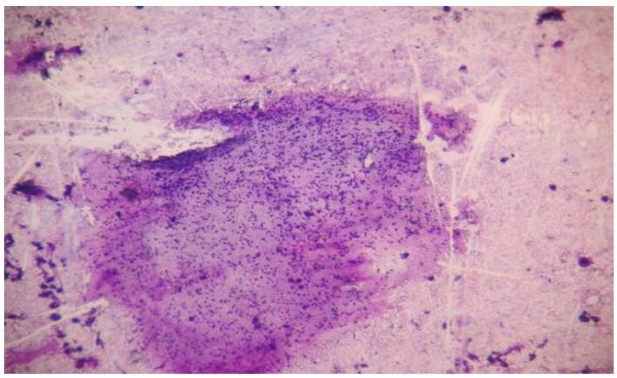

Figure 2: Microphotograph showing presence of acellular material with inflammatory background.

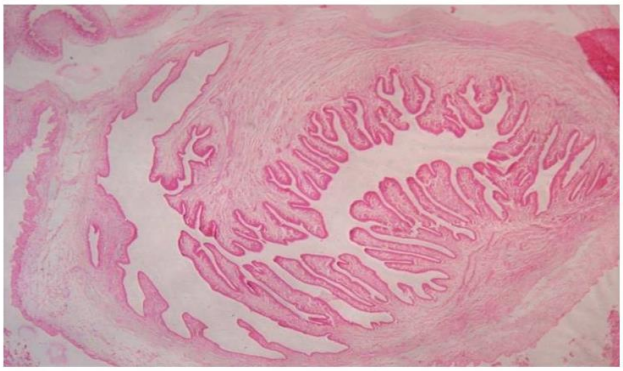

Figure 3: Microphotograph of tissue section showing cycsticercus larva enclosed in fibrous cyst wall.

DISCUSSION

Human cysticercosis is a potentially dangerous systemic parasite caused by larval form of *T. solium*. It has a worldwide distribution including central and Eastern Europe, South America, Africa and tropical countries like India.[5] *T. solium* passes its life cycle in two hosts. The definite host is human who harbors the adult worm and the intermediate host is pig which harbors the larval stage.[6] The mode of transmission is faeco-oral by consumption of raw or uncooked beef or pork, water or vegetables contaminated with taenia eggs.[7] On reaching the stomach, these eggs rupture and oncospheres are liberated. They penetrate the intestinal wall and reach the systemic circulation where they disseminate to different tissues.

Though the parasite can be found in any organ, they are especially common in CNS, eyes, skeletal muscles and subcutaneous tissues.[8] In our study, most common site of presentation was upper extremity followed by neck, abdominal wall, chest wall, calf and back in order of frequency. Agarwal R[3] also reported upper arm as the most common site followed by chest, eyes abdominal wall and neck. However in a study conducted by Gill M et al,[4] neck was the most common site followed by arm, abdominal wall, axilla, cheek and breast. In terms of gender, females were more commonly affected as compared to males. Similar findings were seen by other studies as well.[3,4] Isolated cases involving females were also reported by Goyal DN et al[9] and Chauhan VH et al.[10] Joshi N et al[11] reported a case of cutaneous cysticercosis in a 28 years old male patient. Most of the cases in our study presented with single nodular swelling as corrobated by other study.[3]

Cysticerci nodules in the skin are difficult to differentiate from benign mesenchymal tumours and lymphadenitis on clinical grounds alone. The parasitic nodules present in the form of firm, mobile nodules and are often clinically misinterpreted as lipoma, neurofibroma, epidermoid cyst, ganglion or as lymphadenopathy. In our study lipoma was the most common clinical provisional diagnosis followed by neurofibroma. Cysticercosis was diagnosed clinically only in one case. However cysticercosis was one of the clinical diagnoses in almost one third of cases in study conducted by author.[4]

Various diagnostic modalities employed to detect cysticercosis include radiology, serology and pathological examination. CT Scan and MRI, though sensitive in diagnosing cysticercosis especially when the parasite involves the CNS, are very expensive.[3] Moreover they provide only supportive diagnosis. Serological tests are useful if positive but cannot rule out the disease with negative results. False positivity is expected with the past parasitic infection or cross reactivity with other helminths. Thus, FNAC has emerged as a widely acceptable technique for the diagnosis of cysticercosis.[12]

On FNAC, suspicion of cysticercosis arises with the aspiration of clear fluid from a subcutaneous nodule. The cytomorphology of cysticercosis varies from viable cyst to necrotic and calcified lesions. The most characteristic findings are delicate fragments of bladder wall with tiny, parasitic nuclei in a clear acellular background. In some

cases, scolex with detached single hooklets and/or calcerous corpuscles is also seen. The background shows inflammatory reaction in response to cyst and comprises predominantly of eosinophils along with neutrophils, epithelioid cells and giant cells.[13] In our study actual parasitic structures were demonstrated in 10 cases with 05 cases showing only acellular granular material and no parasite. One case showed hooklet. In the study conducted by Gill M et al[4,9] cases out of 22 demonstrated actual parasite and no hooklet was seen.

In the present study all the cases were subjected to histopathological examination which confirmed the cytological diagnosis with 100% accuracy. Histology in all the cases revealed presence of multilayered cyst wall containing parasite appearing as rounded wavy folds and scolex with hooklets. However, study conducted by Kamal MM[14] reported that the outer cuticular layer of cyst wall appeared smooth and hyalinised and inner layer was loose containing mesenchymal cells and calcareous corpuscles.

In asymptomatic patients with calcified soft tissue, surgical excision is the treatment of choice. In symptomatic patients, especially with neurocysticercosis, antihelminthic drugs in combination with anticonvulsants and corticosteroids are given to reduce the inflammation and risk of seizures.[15]

An accurate diagnosis of cysticercosis is important as it calls for a diligent search for the parasite in vital organs, where it may cause significant morbidity. FNAC proves to be an easy, low cost outpatient procedure in diagnosing cysticercosis preoperatively and may even prevent the need for surgery in asymptomatic cases. A pathologist must be well versed with the cytomorphological spectrum of aspirate ranging from presence of actual parasite to presence of acellular material only with inflammatory reaction in the background. Cysticercosis should be kept as one of the possibilities in all cases of subcutaneous nodular swellings, especially in endemic areas of *T. solium* infection.

CONCLUSION

Cysticercosis is an important parasitic disease which, though common in central nervous system, can also be seen in rare sites like skeletal muscles and soft tissues. The high accuracy coupled with low cost and quick results make FNAC an important outpatient procedure for diagnosis of cysticercosis. In any soft tissue nodular swelling, possibility of cysticercosis must be kept in mind, especially in endemic areas.

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