Asian Pac J Trop Med
2009;2(1):49-53

Original article

Fine needle aspiration cytology in the diagnosis of cysticercosis cases

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Abstract

Objective: To document the value of Fine Needle Aspiration Cytology (FNAC) in the diagnosis of cysticercosis. **Methods**: Aspirates smears of 102 cases of cysticercosis from different sites like extremities, head, neck, forearm, arm, chest wall and abdominal wall were studied in the Department of Pathology, BPKIHS, Dharan, Nepal. **Results**: In 7 cases (9.73%) lingual cysticercosis was diagnosed. Involvement of breast was seen in 4 cases (5.56%) which is a rare presentation. On cytomorphological examination, parts of cysticercus cellulose were seen in (97.22%) cases. **Conclusion**: The characteristic cytomorphological features of parasitic tegument, parenchymatous portion, presence of giant cells and inflammatory cells in cytological smears help diagnose the cases of cysticercosis. FNAC provides safe and rapid tool for diagnosis of cysticercosis. In endemic areas, cysticercosis should be considered one of the differential diagnosis of the swellings.

Keywords: Cysticercosis; Cytomorphology; FNAC

INTRODUCTION

Infectious and parasitic diseases have always challenged man, although many of them are typically seen in some areas of the world and can be adequately managed by just improving socioeconomic status and sanitary conditions. This study on cyticercosis focuses on infectious and parasitic diseases found in a developing country that may be useful for pathologists when facing somewhat strange cases from developing countries.

Cysticercosis is a worldwide infection caused by larval stage of a cestode, Taenia solium. Worm infestation is acquired by ingestion of undercooked pork containing the cysticerci. The larvae develop into sexually mature adult worms in the intestine. Cysticercosis has been reported after contamination of food with eggs of Taenia solium by immigrant cooks infected with the pork tapeworm[1,2]. The eggs and gravid segments are excreted out in the faeces.

Cysticercosis is a common disease in most developing countries[3]. It has its greatest prevalence in Mexico, other areas of Latin America, India, China, Africa and Europe[4]. Cysticerci may present as single or multiple painless swellings in any organ or tissue of the body, the most common sites in order of frequency being the subcutaneous tissue, brain, muscle, heart, liver, lungs and peritoneum[5]. These are usually mistaken clinically for dermatofibroma, neurofibroma, sebaceous cyst, dermoid cyst and calcified lymphnodes. Biopsy is a gold standard for definitive diagnosis of any lesion but now a day's fine needle aspiration cytology (FNAC) in the diagnosis of various parasitic lesions is well documented[6,7].

In the present study we report clinical profile and findings in fine needle aspirates of the cases diagnosed as cysticercosis.

MATERIAL AND METHODS

Over the period of 5 years from September 2001 to

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August 2006, 102 cases of cysicercosis were diagnosed in the Department of Pathology, B. P. Koirala Institute of Health Sciences, Dharan, Nepal. All the patients presented with swellings of different regions of the body. FNA was performed with 22 gauge needle and 10 ml disposable plastic syringe. Aspirated materials were smeared onto the glass slides. Two slides were fixed immediately in 95% ethylalcohol and stained with Papanicolaou stain. Two air dried smears were stained with May-Grunwald-Giemsa stain. Cases which were biopsied were processed for histopathological examination, stained with hematoxylin and eosin.

RESULTS

During a period of 8 years, 102 cases of cysticercosis were diagnosed on FNA cytology. 53 patients were males and 49 patients were females. The age ranged from 1 to 82 years with majority of the patients (76.38%) being younger than 40 years of age. Distribution sites are given in Table 1.

Most frequently affected site was upper extremity (47.28%). In 7 cases (9.73%) lingual cysticercosis was diagnosed in our study. Involvement of breast was seen in 4 cases (5.56%) which is a rare presentation. In 3/4 (75%) cases lump was present in upper outer quadrant of breast. Details are shown in Table 2. One case of breast lump was diagnosed as a case of fibroadenoma on fine needle aspiration cytology. Mass on excision showed attached 0.7cm diameter grey white nodules, sections from which revealed presence of cysticercus cellulose. Clinically (98.7%) cases presented with a solitary lesion in the present study. The wide ranges of clinical diagnosis considered are given in Table 3. Fine needle aspirates in our study yielded clear fluid in (32.27%) cases, blood mixed aspirate in (23.01%) cases and pus like aspirate in (44.72%) cases.

Details of cytomorphologic findings of the present study are given in Table 4. Fragments bluish fibrillary glial like structure. Outer wall layer was seen thrown into rounded wavy folds with tiny ovoid nuclei in a fribrillary stroma comprising of thin reticulin fibrils beneath it. (Fig 1 & 2). In rest two of the cases (2.77%) diagnosis was suggested on associated other cytomorphologic features and inflammatory reaction comprising of eosinophils, neutrophils, histiocytes, epithelioid cells, lymphocytes and giant cells in varying proportions which were confirmed later on biopsy.

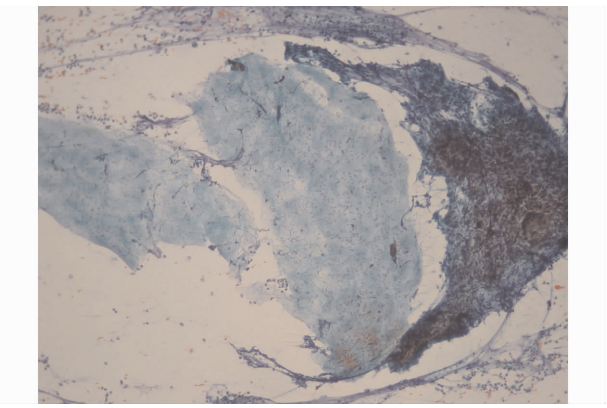

Figure 1 Photomicrograp cysticercus cellulosae cyst wall on fine needle aspiration cytology (Papanicolaou stain, × 400).

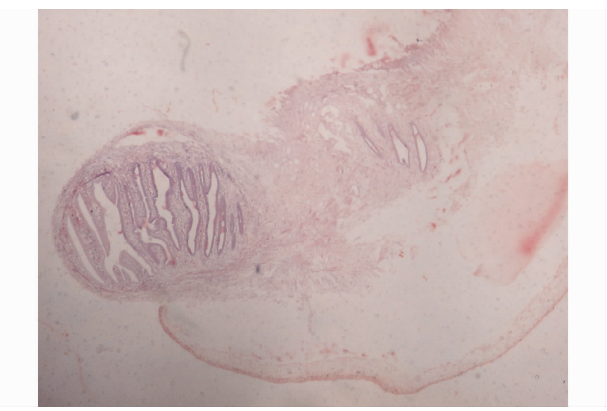

Figure 2 Photomicrograph show cysticercus cyst on histopathology (H&E, × 200).

Table 1 Site of lesion in 102 cases.

Site	Number
1. Subcutaneous swelling	
a) Upper extremity	48
b) Neck	19
c) Tongue	7
d) Abdominal wall	6
e) Breast	4
f) Cheek	2
g) Lower extremity	2
h) Chest	1
i) Ear retroauricular	1
j) Parotid	1
k) Bony orbit	1
l) Oral cavity	1
2. Soft tissue swelling	
a) Abdominal wall	2
b) Thigh	1
3. Intra muscle swelling	1
a) Gluteal	1

Table 2 Distribution of site in breast cysticercosis.

Case No.	Age (yrs)	Site (Quadrant)	Size (cm)	Duration (years)	Cytological findings	Histological findings
1.	35	UOQ	2.5 x 2	1	Proteinaceous material	Cysticercosis
2.	41	UOQ	2 x 1.5	1	H + AIE + E	Cysticercosis
3.	26	UOQ	1.5 x 1.5	4	Cysticercus + AIE + E	Not done
4.	30	LOQ	1.5 x 1	2	Cysticercus	Not done

UOQ: Upper Outer Quadrant, LOQ: Lower Outer Quadrant H: Histiocytes AIE: Acute Inflammatory Exudates E: Eosinophil

Table 3 Clinical Diagnosis in 102 cases.

S. N.	Clinical Diagnosis	No. of cases
1.	Sebaceons cyst	7
2.	Dermoid cyst	6
3.	Calcinois cutes	2
4.	Lipoma	4
5.	Neurofibroma	8
6.	Dermatofibroma	9
7.	Calcified lymphnode	6
8.	Tuberculous lymphnode/lymphadenitis	5
9.	Paracytic cyst	10
10.	Fibroadenoma breast/Fat necrosis	2
11.	None	43
	Total	102

Table 4 Cytomorphological findings in 102 cases.

S. N.	Cytomorphologic features	Cases
1.	Polymorphous inflammatory cell filtrate comprising mainly of eosinophils, histiocytes, neutrophils and lymphocytes	43
2.	Well formed granuloma	35
3.	Scattered epithelioid cells	18
4.	Foreign body giant cells	30
5.	Parts of parasite	
	Fragments of viable parasitic wall	66
	Degenerated parasitic wall	2
	Hooklets & Scolex	2
6.	Calcareous spherules	8
7.	Background	
	Necrotic	20
	Proteinaceous (clear)	29

DISCUSSION

Cysticercosis in humans is due to infection with eggs of Taenia solium[8]. Pig is an intermediate host and humans are its definitive host. It continues to be a major public health problem in most tropical and subtropical developing countries where there is consumption of unprocessed pork as well as a lack of sanitation and hygiene. Nepal is still an endemic area of cysticercosis. A retrospective analysis of fine needle aspirates of 102 cases of cysticercosis presenting as palpable nodule is presented from Nepal. The age ranged from 1 year to 82 years. Peak incidence was noted in 3rd and 4th decade. In Kapila et al[9] study age ranged from 16 to 61 years with peak incidence in 3rd decade. Arora et al[10] reported the age range from 2 to 54 years. No predilection for sex was noted, male female ratio being 1.2:1. Cysticercosis

can involve almost all organs of the body. However, the most commonly affected site is the subcutaneous tissue. Other organs affected by cysticercosis include eye, brain, spinal cord, muscle, heart, lung and liver. The adult worms and larvae are pathogenic to men. The adult worms sometimes may cause mild inflammation, however larvae commonly cause serious inflammatory lesion[11]. In our study most common site was found to be subcutaneous swellings on upper extremity which concurs to the study by Tayal et al[12]. The diagnosis of cysticercosis in unusual sites may be clinically difficult.

In the present study lingual cysticercosis was seen in 7 cases (9.73%). Most cases appeared as asymptomatic nodules that resembled benign mesenchymal neoplasms. In all cases, simple surgical excision was sufficient to ensure complete removal of the lesions without postoperative complications. It is important to carry out a detailed study in every case, in order to exclude the presence of the parasite in other sites. Although cysticercosis is a common disease in developing countries, oral lesion are rare[13]. One study places the prevalence of lingual cysticercosis as 7.4%[14].

A young female patient in our study presented with features resembling acute parotitis. Cysticercosis of the parotid gland was diagnosed, based on fine needle aspiration cytology which is rare.

Bone involvement in cysticercosis is a rare occurrence. A twenty nine-year-old male was diagnosed as cysticercosis of the orbital bone. The diagnosis was established by FNAC and histopathological examination of the cyst.

In the present study 4 cases (5.56%), clinically suspected to be the cases of fibroadenoma were diagnosed as cases of cysticercosis on fine needle aspiration (FNA) cytology. Breast is an unusual site for the cyst form and only few cases had been reported in the literature[15-17]. A series of 8 cases of cysticercosis of breast diagnosed by FNA cytology[9] is recorded. Amatya and Kimula[18] had reported 62 cases of cysticercosis from Nepal out of which 5 were from subcutaneous tissue of breast. These cysts could very well be subcutaneous and present clinically as primary breast mass[15, 17] including breast carcinoma[19]. In one of our case FNA cytology missed the parasite perched on the fibroadenoma of the breast and associated cysticercosis was diagnosed as an incidental finding on histopathological examination of surgical specimen. Breast cysticercosis showed predilection for the upper outer quadrant, as has also been reported earlier[9] though its significance could not be ascertained. There did not appear to be any preference for the side and both breasts were equally involved.

Cysticerci may present as single or multiple painless soft tissue swellings or visceral masses. These are usually mistaken for lipoma, calcified lymphnodes and sebaceous cysts. In our study 24 cases (33.33%) were misdiagnosed clinically as cases of dermatofibroma, neurofibroma and sebaceous cyst.

The soft tissue was affected by cysticercosis in our study. Preoperative diagnoses of the lesions were as follows: lipoma, cysts, abscesses, fat necrosis and lymphadenitis. The mean size of lesions was 1.5 cm; the minimum and maximum sizes were 0.3 and 3 cm, respectively. The ratio of males to females with soft tissue swellings was 1 to 5, which may reflect differences in eating habits and social life between males and females in the society. Our findings indicated thatmany of the cases in our study could not be diagnosed as cysticercosis preoperatively. Therefore, clinicians should include cysticercosis in the differential diagnosis of soft tissue cystic nodules or masses. Data regarding the sizes of lesions should be helpful in differentiating this entity from other soft tissue lesions in clinical practice and on magnetic resonance imaging. FNA cytology is a simple and reliable procedure for the diagnosis of cysticercosis. The current study highlights the role of fine needle aspiration cytology (FNAC) in the diagnosis of cysticercosis. One hundred and two patients diagnosed as cysticercus or suspicious of parasitic inflammation on FNAC were included in the present study.

In principle, a mass produced by cestode should not be diagnosed by FNAB since it might cause anaphylaxis and/or dissemination of parasites. A review of the literature has not revealed any reports of such complications when cysticercosis was diagnosed by FNAB[7, 8]. The features of cysticercosis on FNAB include presence of parts of cysticerci, necrosis, calcification, inflammatory cells, granulomas and giant cells[10]. Most of the authors have described identification of parasitic fragments in a characteristic inflammatory background[10, 17, 20] as was seen in our study. The body of the fully developed cysticercous cellulose has a bladder and an invaginated portion. The scolex is sealed under the bladder cavity which is filled with clear fluid. The body wall shows deep notches in the thick integument[21, 22]. The dying larvae provoke acute inflam-

matory response with necrosis while viable larvae evoke a granulomatous reaction with foreign body giant cells[7, 23]. The large hooklets can be identified at low magnification[10, 23] and should be searched in aspirates of subcutaneous lesions with eosinophilic response in a predominantly necrotic background. Occasionally in cysticercosis necrotic tissue is noticed predominantly and larvae is hidden but not seen on the smears. In these cases re-aspiration could be of great help.

Since FNA cytology could results in leakage of parasitic fluid into the surrounding tissue, it can cause anaphylactic reaction. One of our case had local anaphylactic reaction and smears showed many eosinophils in an inflammatory background. Many eosinophils in an inflammatory background had been seen in cases of cestodes diagnosed by FNAB[3]. It is therefore possible that many eosinophils are a morphologic feature in patients with an anaphylactic reaction. It has been suggested that if the patient has local anaphylactic symptoms after FNAB, the cytopathologist should make a careful search for the broken body of a parasite[3].

Thus, to conclude, FNAC is a reliable and cost effective procedure for the diagnosis of subcutaneous parasitic nodules. It obviates the need for a subsequent histopathological examination, as the parasite may not be demonstrated even on biopsy specimens. The presence of tiny fragments of larval wall or detached hooklets in a background of inflammatory exudates rich in eosinophils helps the cytologist in giving a rapid diagnosis with certainty. In some cases the possibility of a parasitic lesion can be suggested in absence of larval parts based on eosinophilic and histiocytic inflammatory response so that early and effective therapy can be started.

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