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Original Article

Pathology Section

Fine Needle Aspiration Cytology of Giant Cell Tumour of Tendon Sheath

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ABSTRACT

Introduction: Giant Cell Tumour of Tendon Sheath (GCTTS), also known as localised nodular tenosynovitis, is a slow growing benign soft tissue tumour arising from synovium of tendon sheath, bursa or joint. Clinically, the lesions occur as skin-coloured nodules typically on the extremities. These tumours occur more frequently on the upper limbs especially hands (77%) where they form the second most common tumour following simple ganglion cyst.

Aim: To describe the cytomorphologic findings in GCTTS and their histopathological features.

Materials and Methods: This retrospective study was conducted at Department of Pathology, ESI Hospital, New Delhi, India, in 12 diagnosed GCTTS cases for their cytological features from January 2015 to December 2017. Fine Needle Aspiration Cytology (FNAC) was performed with a 22-gauge needle attached to a 10 mL syringe. Smears were air-dried and stained with Giemsa stain. Cytomorphology of all the selected cases were analysed and descriptive statistics were used to evaluate the cases.

Results: A total of 12 cases of GCTTS were retrieved. Diagnosis of GCTTS was made by FNAC in all the cases and confirmed by histopathological examination in half of the cases. The mean age of presentation was 39 years. Of these, 8 (66.67%) were women and 4 (33.33%) were men. The lesions were found most commonly over the index finger (n=5) followed by the ring finger (n=3), thumb (n=2), middle finger (n=1) and little finger (n=1). The most frequent clinical presentation was a painless, nodular, slow growing firm swelling over the finger. FNAC revealed cellular smears with few clusters and numerous scattered stromal cells along with interspersed multinucleated giant cells.

Conclusion: A definitive preoperative diagnosis of GCTTS obtained through FNAC helps in formulating appropriate treatment plan. Histopathologic examination will confirm the cytological diagnosis and can help to predict recurrence by providing information on the resection margin, any satellite nodules, variable cell types and mitotic activity.

Keywords: Haemosiderin laden macrophages, Multinucleated giant cells, Small joints

INTRODUCTION

Giant Cell Tumour of Tendon Sheath (GCTTS) are benign, solitary, slow growing soft tissue tumours commonly affecting the hands. They are also known as fibrous histiocytoma of synovium, pigmented nodular tenosynovitis, tenosynovial giant cell tumour, localised nodular tenosynovitis, benign synovioma, and fibrous xanthoma of synovium [1]. The common age group affected is 30 to 50 years with a female preponderance [2]. These tumours occur more frequently on upper limbs, especially hands (77%). They are the second commonest tumour of hands following simple ganglion cyst [3]. Other locations are spine, elbow, hip, knee, ankle and feet [4-6]. The diffuse form, also called pigmented villonodular synovitis occurs in younger age group and involves larger joints such as knee, elbow and ankle [5]. Fine Needle Aspiration (FNA) is usually performed to evaluate such superficially located lesions and carries the advantage of offering quick results, following which a complete surgical excision is planned. The study aimed to describe the various cytomorphologic findings in cases of GCTTS and their histopathological features, wherever available.

MATERIALS AND METHODS

The present retrospective study included all cases of GCTTS diagnosed over a period of three years, from January 2015 to December 2017 in the Department of Pathology, ESI Hospital, New Delhi, India, were reviewed. A total of 205 cases of soft tissue tumours were retrieved from the archives which included 12 cases of GCTTS. Retrospective analysis of these 12 cases was done in December 2019.

Clinical details such as age, gender, tumour location, presentation and size were noted. FNAC was performed using 22-gauge needle attached to a 10 mL syringe. Smears were air dried and stained with Giemsa stain. Half of the swellings were subjected to histopathologic examination as well. Slides were prepared following routine tissue processing and subsequently stained with Haematoxylin and Eosin (H&E) stain.

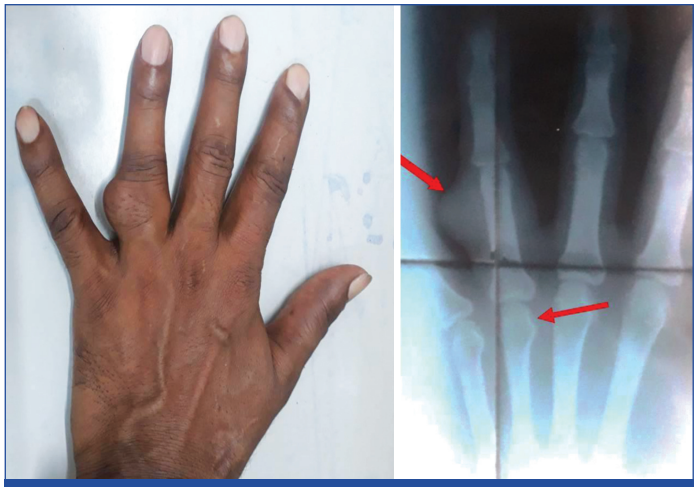
STATISTICAL ANALYSIS

Descriptive statistics were used for analyses of the cases.

RESULTS

Twelve cases of GCTTS were retrieved and studied. These included 8 (66.67%) women and 4 (33.33%) men with male to female ratio of 1:2. The age at presentation ranged from 22 to 68 years with mean age of 39 years. The most common clinical presentation included painless, solitary, slowly progressive swelling over a finger, X-ray films revealed mild erosion of the underlying bone in two cases [Table/Fig-1,2]. There was no restriction of movements of the fingers. The most common location was index finger in 5/12 (41.66%) cases, ring finger in 3/12 (25%) cases, thumb in 2/12 (16.66) cases and middle finger and little finger in 1/12 (8.33%) cases each [Table/Fig-3].

Fine Needle Aspiration Cytology (FNAC) was performed in all cases. In 11 (91.67%) cases the smears were cellular with few clusters and numerous scattered stromal cells were seen with interspersed multinucleated giant cells. The stromal cells were spindle to polygonal in shape showing oval to plump nuclei having bland nuclear chromatin and moderate amount of cytoplasm. A few binucleated cells and foamy cells were also seen [Table/Fig-4a,b]. In 1 (8.33%) case multinucleated giant cells could not be found. On cut section, the surface was dark brown and homogenous [Table/Fig-5]. Histopathologic examination could be performed in six cases. Grossly, the specimens were mostly well circumscribed,

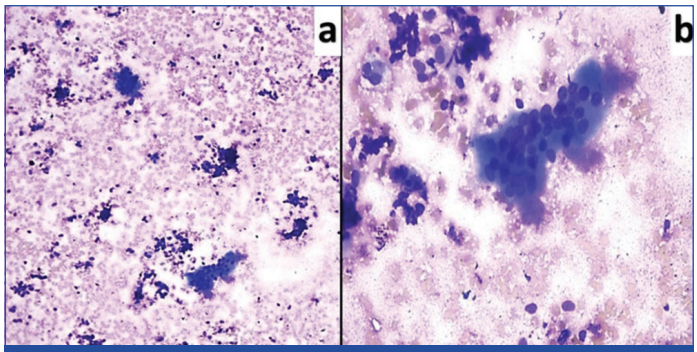


[Table/Fig-1]: Mass over left proximal ring finger; **[Table/Fig-2]:** Posteroanterior radiograph of the same patient as in [Table/Fig-1], showing soft tissues shadow and scalloping of the shaft of bone of left ring finger. (Images from left to right)

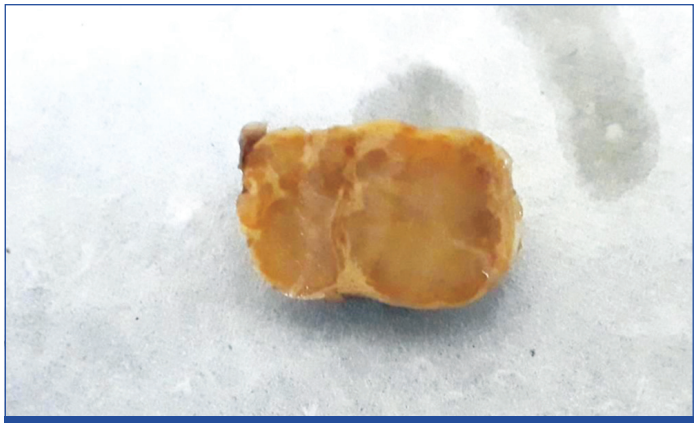
Anatomical location	Number of cases (N)	Percentage (%)
Index finger	5	41.67
Ring finger	3	25
Thumb	2	16.67
Middle finger	1	8.33
Little finger	1	8.33
Total	12	100

[Table/Fig-3]: Anatomical distribution of GCTTS (N=12).

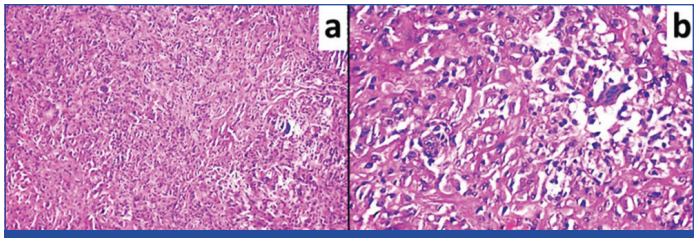
encapsulated, showing multinodular, soft to firm masses with an average size of 3.1 cm and a smooth external surface. Microscopic picture comprised of fibrohistiocytic proliferation with histiocytes showing foamy cytoplasm, presence of multinucleated giant cells, haemosiderin laden macrophages and collagen strands [Table/Fig-6a,b]. Synovial cell hyperplasia was seen in one case. No mitotic activity was reported in any of the cases and none of them showed recurrence on follow-up of 8-12 months.



[Table/Fig-4]: FNAC smears showing many multinucleated giant cells with binucleate cells and scattered single stromal cells (a: Giemsa, 100X; b: Giemsa, 400X).



[Table/Fig-5]: Circumscribed and multinodular mass with cystic and haemorrhagic areas on cut surface.



[Table/Fig-6]: Histopathology showing multiple multinucleated giant cells interspersed in tumour cells (a: H&E, 100X; b: H&E, 400X).

DISCUSSION

The GCTTS are slowly progressive soft tissue swellings developing over a period of months to years [7]. This entity was previously thought to be a reactive process- an inflammatory process secondary to chronic antigenic stimulation or reactive proliferation of synovial lining of the tendon sheath and joint. Presently, it is considered as a neoplastic pathology [8]. There may also be a prior history of trauma at the same site. The other associated factors include metabolic disease and other neoplastic conditions [9-11]. The molecular alteration implicated is overexpression of CSF1 gene by a neoplastic component causing recruitment and activation of non neoplastic cells which together constitute the main tumour [8]. GCTTS are classified into two types: localised and diffuse [12]. The localised form is encapsulated, usually extra-articular and affects tendon sheath of the fingers whereas the rare diffuse form is unencapsulated, intra-articular and typically involves large joints. These may occur at any age but mostly occur between ages of 30 and 50 years and mainly affects women [2]. In the current study, age varied from 22-68 years and there was preponderance of women over men (2:1). These findings are in accordance with the study of Ushijima M et al., [5].

The index finger was the most commonly affected site in the present study. This finding is in accordance with studies by Fotiadis E et al., and Briët JP et al., who noted GCTTS affecting index finger with an incidence of 29.7% and 30%, respectively [4,13]. However, Di Grazia S et al., observed middle finger (23.5%) as the most frequent site of involvement followed by the thumb (20.3%) [14].

Radiological examination is important in such cases as it helps in excluding bony lesions. X-ray demonstrates eccentrically placed lytic lesions with well defined, non sclerotic margins [15]. In the present study, the radiographs were unremarkable except in two cases which showed soft tissue masses with mild erosion of the underlying bone.

FNAC is often the preferred preliminary investigation for such lesions due to the easily accessible sites and rapid results. It is a widely accepted, a cost-effective tool, and provides rapid and definitive diagnosis of these lesions preoperatively [16]. Familiarity with the characteristic findings on cytology smears can provide initial important clues to the diagnosis and warrant subsequent histopathologic confirmation. In the present series, FNA was performed in all cases and revealed cellular smears showing stromal cells with interspersed multinucleated giant cells. Most authors mention presence of osteoclast-like giant cells combined with typical stromal cells and haemosiderin laden macrophages in aspirates of soft tissue tumours as being virtually diagnostic of GCTTS [16,17]. However, the other differential diagnoses that must be considered are synovial sarcoma, benign fibrous histiocytoma, giant cell tumour of bone and solid aneurysmal bone cyst [6]. Presence of osteoclast type giant cells rules out synovial sarcoma and benign fibrous histiocytoma whereas peripheral adherence of giant cells to the spindle cell component is a characteristic feature that helps to diagnose giant cell tumour of bone [6]. Presence of dense, homogenous, extracellular matrix material with closely associated mononuclear cells is commonly seen in solid aneurysmal bone cyst [6]. The histopathologic examination shows

polyhedral histiocytes, multinucleated giant cells, fibrous tissue and haemosiderin deposits [17,18].

Treatment of GCTTS includes complete surgical excision with preservation of flexor tendon, extensor tendon, digital arteries and nerves. The surrounding tissues must be examined for presence of satellite nodules which should also be excised during surgery however, recurrences may sometimes occur due to incomplete removal. The recurrence rate reported in literature is as high as 45% [19]. In the present study, none of the cases showed recurrence on follow up of 8 to 12 months. Rao AS and Vigorita VJ found high rates of recurrence in tumours with increased mitotic activity whereas Rodrigues C et al., pointed out that subcutaneous origin of GCTTS and their deeper extension to underlying neurovascular bundles interfere with their complete excision and could be the reason for recurrence in such cases [20,21]. Other factors contributing to their high recurrence include proximity to distal interphalangeal joints of thumb, presence of degenerating diseases, pressure erosions, types of cells, capsular invasion and increased mitotic activity [9,22]. The low recurrence rate in the current study could be attributed to absence of mitosis and complete excision of the lesions owing to their superficial location in most of the cases.

Limitation(s)

However, the present descriptive study is on cytomorphology of GCTTS. While FNA is adequate for diagnosis of this condition as suggested in other studies also, capsular invasion and increased mitotic activity which predict high recurrence rate, cannot be assessed on FNAC alone. Also, larger studies with greater sample size may help to provide more elaborate data.

CONCLUSION(S)

Fine Needle Aspiration Cytology (FNAC) is a simple and rapid technique for diagnosing GCTTS. It helps in proper treatment planning and obviates the need for histopathologic diagnosis prior to their surgical excision. Histopathologic examination can complement the diagnosis as well as provide information about adequacy of the resection margin and the mitotic activity which helps determine the prognosis. FNAC is crucial in evaluation and diagnosis of superficial lesions involving the limbs especially the fingers. It serves as an important preliminary investigation and aids in planning treatment.

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