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TENOSYNOVIAL GIANT CELL TUMOR: CLINICOPATHOLOGICAL ATTRIBUTES OF 5 CASES

Pathology

Dr. B. P. Singh Director Professor & Head, Department of Pathology, Chhattisgarh Institute of Medical Sciences, Bilaspur, Chhattisgarh.

Dr. Rashmi Gupta Associate Professor, Department of Pathology, Chhattisgarh Institute of Medical Sciences, Bilaspur, Chhattisgarh.

Dr. Poornima Pandey Assistant Professor, Department of Pathology, Chhattisgarh Institute of Medical Sciences, Bilaspur, Chhattisgarh.

Dr. Chitrangi P. Barpande* Associate Professor, Department of Pathology, Chhattisgarh Institute of Medical Sciences, Bilaspur, Chhattisgarh. *Corresponding Author

Dr. Soumya Jain Post Graduate Resident, Department of Pathology, Chhattisgarh Institute of Medical Sciences, Bilaspur, Chhattisgarh.

ABSTRACT

Background: Tenosynovial giant cell tumor [TSGCT] has been studied by many authors over the years as a popular tumor for probably being second most common soft tissue tumor of hand after ganglion cyst. This tumor is primarily observed in individuals aged 30-50 years and exhibits a higher incidence in women as compared to men. Approximately 45% of reported significant cases by studies, have been observed to show local recurrence even after excision. Few etiological considerations surrounding these tumors have generated multiple hypothesis; however, consensus on prognostic factors, recurrence rates remain fugitive. **Aim:** The aim of this study is to evaluate 5 cases of tenosynovial giant cell tumor of tendon sheath and correlate cytopathological as well as histopathological features in conjuncture with immunohistochemistry for confirmation. **Materials And Methods:** This retrospective and prospective study included 5 cases which were studied corelating clinical, cytopathological, histopathological and immunohistochemical features, collected between July 2023 and October 2025. Clinical details were retrieved from records and data were analysed using descriptive statistics. **Results:** The total number of cases was 5, of whom 3 were males, and 2 were females. The mean age was 38 years. All the lesions studied except one was located in the wrist area with maximum lesions affecting the fingers. Painless swelling was the most common presentation. All of them were treated surgically and were studied for their histomorphology and cytomorphology. **Conclusion:** After reviewing the literature and comparing with our results, we conclude that tenosynovial giant cell tumor is a true benign, locally aggressive tumor whose definitive diagnosisis mostly established by histopathology and cytopathology after complete excision of the tumor. Here we present a case series comprising of 5 cases for whom marginal excision was done and they were studied comprehensively for their histomorphology and cytomorphology.

KEYWORDS

Tenosynovial giant cell tumor, histopathology, cytopathology.

Tenosynovial giant cell tumor is an uncommon benign soft tissue tumor of unknown etiology [1]. It originates from synovial cells of tendon sheath and the joints [2,3]. Since it belongs to a rare group of proliferative disorders of the synovial joints and tendon sheaths, for this reason it has been referred to the literature by a diversity of titles like fibrous xanthoma, pigmented villonodular tenosynovitis, sclerosing hemangioma and benign syno-vioma. It is a painless tumor with slow growing period for clinical manifestation which varies from months to years [3]. It is the second most common tumors of hand followed by ganglion cyst [4]. Giant cell tumor of tendon sheath are associated with high recurrence if proper marginal excision is not done [4,5]. Possible etiological factors for GCT may be inflammation, metabolic disease and neoplastic etiology, however majority of the cases are of unknown etiology [5]. It is majorly of two types, the localized nodular type (common in hand) and the diffuse type [common in other joints] with each of the type sub classified according to the thickness of the capsule, lobulation of the tumor, the presence of satellite lesion and the diffuse and multicentric nature of the tumor [5]. The primary step in the diagnosis of GCT is clinical examination, patient medical history and standard radiography, however correlation with fine needle aspiration cytology and histopathological examination remain the most important tools for pre operative planning as well as diagnosis of the lesion.

CASE SERIES:

This retrospective as well as prospective case series involved 5 patients diagnosed with Tenosynovial Giant Cell Tumor of the Tendon Sheath (GCTTS) at Department of Pathology, Chhattisgarh Institute of Medical Sciences, Bilaspur, [C.G]. We retrieved clinical data from medical archives, focusing on the presentation of slow-growing, firm, and typically painless subcutaneous nodules that occasionally caused joint stiffness or reduced range of motion. Radiographic evaluation via X-ray was conducted to identify characteristic soft tissue masses and assess for secondary bony involvement, such as cortical pressure erosions.

Case 1:

A 49 year old male presented with a painless swelling over the distal phalanx of right little finger for 8 months. There was negative history of trauma. Thorough examination revealed a small, firm, lobulated, tender, movable in the distal area over the distal half of right little finger. Radiological investigation revealed no indentation of bony structures and cytopathological examination suggested tenosynovial giant cell tumor. Marginal excision was done, and the specimen was sent for histopathological examination (Fig 1- A,B,C).

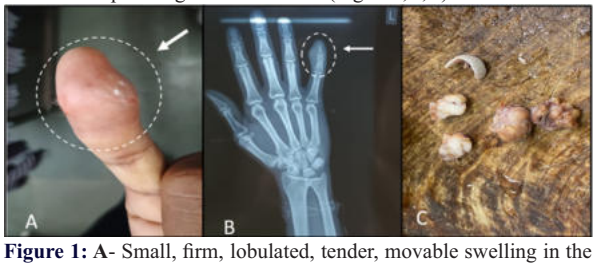

Figure 1: A- Small, firm, lobulated, tender, movable swelling in the distal area over the distal half of right little finger (Gross findings).
B- X ray AP view revealed no indentation of bony structures.
C- Histopathological specimen.

Case 2:

A 28 year old female came to cytopathology OPD with chief complaints of a slow growing painless swelling in right wrist, over flexor aspect since two years. The cytomorphological analysis focused on identifying the characteristic triad of mononuclear stromal cells, multinucleated giant cells, and pigment-laden macrophages, which provide a preliminary morphologic diagnosis(Fig 2-D).

Case 3:

A 25year old female presented with a firm painless swelling in the left thumb since six months. Histopathological examination revealed

partially capsulated lesion with larger polygonal cells, with vacuolated granular cytoplasm and vesicular nuclei, along with areas showing osteoclastic type of tumor giant cell and clusters of cholesterol cleft spaces, which was confirmative of our diagnosis (Fig 2-E).

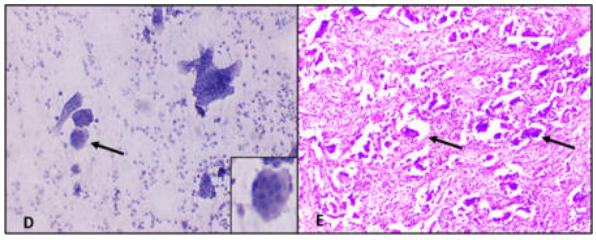

Figure 2: D-Cytomorphological features depicted presence of mononuclear stromal cells, multinucleated giant cells, and pigment-laden macrophages. **E**- Histomorphological features depicted larger polygonal cells, with vacuolated granular cytoplasm and vesicular nuclei, along with areas showing osteoclastic type of tumor giant cells.

Case 4:

A 42 year male presented with non tender, firm, non-trans-illuminating mass over proximal aspect of left middle finger. Apart from routine histopathology, additional investigation involving immunohistochemical examination was carried out, which revealed diffuse positivity for CD68 in the mononuclear epithelioid cells and strong cytoplasmic positivity in multinucleate giant cells. The conclusive positivity results displayed 45% cells showing +2 intensity grading score (Fig 3-F).

Case 5:

A 50 year male presented with a lobulated, tender swelling on the flexor aspect of right ring finger. In this case, we used CD45 to exclusively draw conclusions on the localised as well as diffuse positivity illustrating osteoclast like giant cells. It revealed 85% giant cells were stained with +3 intensity score (Fig 3-G).

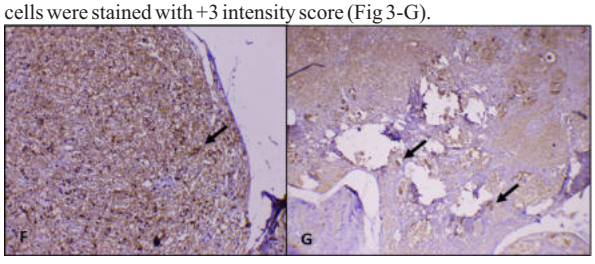

Fig 3: F- Immunohistochemical marker CD68 displaying diffuse positivity in the mononuclear epithelioid cells (+2, 45% of cells stained).

G- Immunohistochemical marker CD45 exhibiting localised positivity for osteoclast like giant cells (+3, 85% of cells stained).

DISCUSSION:

Tenosynovial giant cell tumor starts spontaneously, although some patients may feel its onset after minor trauma only [1,2,3,4].It is free from overlying structures, but may cause indentation on bone, if it is very large in size and longstanding in duration. The patient often presents late because this tumor does not cause functional instability[5].It is common in hand though described in wrist, ankle and foot[2,3,6].

Tenosynovial giant cell tumor has mostly two clinical presentations.The most common type is localized or nodular type. The localized type is common in hands, while diffuse type is common in joints[4].This entity is recognized by several synonyms in literature, including fibrous histiocytoma of the tendon sheath, xanthogranuloma, and benign synovioma[7,8].This pathology comprises a spectrum of benign inflammatory and proliferative processes originating from the synovial lining of joints, bursae, and tendon sheaths[6]. While distinct from overlying skin structures, larger and more chronic tumors can cause pressure erosions on the adjacent bone[9,10].Tenosynovial giant cell tumortypically affects individuals in their third to fifth decades, with a female-to-male predilection of 3:2. Although the general population incidence is low (1 in 50,000), it is a frequent hand tumor. The anatomical distribution favors the index finger (29.7%), followed by the middle (24.6%), ring (16.8%), and little (16%) fingers, with the thumb being the least common site at 12.9%. The etiology of tenosynovial giant cell tumor remains multifactorial, with proposed triggers including trauma, inflammation, metabolic disturbances, and neoplastic transformation [2].

Furthermore, several clinical and surgical variables are implicated in the high rate of local recurrence observed in these patients [11,12,13,14]. Khan O et al. [1]noted that fine needle aspiration cytology of the tumor helps in making accurate pre-operative diagnosis thus facilitates a well-planned surgical approach. On microscopy tenosynovial giant cell tumor shows osteoclastic giant cells, polyhedral histiocytes, fibrosis, lipid laden cells and hemosiderin deposits. Korumilli RK et al. [2] and Dhaniwala MN et al. [4] noted whether the tumor is solid or cystic using radiological parameters, they studied that x ray helps us to identify if there is any underlying bone or joint involvement.Kastanis G et al. [3] stated the histomorphological and cytomorphological findings which was analogous to our study. Our case series displayed amalgamation of histomorphological, cytomorphological and immunohistochemical features tabulated as below (Table no. 1):

Table No 1: Clinicopathological And Immunohistochemical Findings.

S. No.	Age	Sex	Site	X ray finding	FNA finding	Histopathology finding	IHC intensity score	IHC scoring
1.	49	M	Rt little finger-distal phalanx	No bony involvement	Heterogeneous cell population of large mononuclear cells and scattered osteoclast like multinucleated giant cells	Mononuclear cells, multinucleated giant cells, inflammatory cells	+1	10% cells
2.	28	F	Rt wrist- flexor aspect	Only soft tissue involvement	Mononuclear stromal cells, multinucleated giant cells, and pigment-laden macrophages	Osteoclast like multinucleated giant cells, pigmentedhistiocytes, mononuclear cells	+3	62% cells
3.	25	F	Lt thumb	N/A	Large polygonal to spindle mononuclear cells, multinucleated giant cells	Large polygonal cells, foamy macrophages, multinucleated giant cells	+1	5% cells
4.	42	M	Left middle finger-proximal interphalangeal joint	No bony involvement	Heterogeneous population of polygonal to spindled mononuclear cells, multinucleated giant cells and some foamy macrophages	Large mononuclear epithelioid cells, xanthoma cells, multinucleated giant cells	+2	45% cells

5.	50	M	Rt ring finger- flexor aspect, over middle phalanx	No bony indentation noted	Abundant population of mononuclear cells with osteoclastic giant cells and few pigment laden macrophages	Osteoclast like multinucleated giant cells, stromal cells, hemosiderin laden macrophages	+3	85% cells

The recurrence rates after excision of the tumor ranges from 7% to 45% as studied byNagaputra JC et al. [6] and Hasan A et al. [7]. Meticulous excision of giant cell tumor of tendon sheath reduces the incidence of recurrence[2].There are few cases as noted byUshijima M et al. [8]that,there is bony involvement in the tumor.Following this, the use of fine needle aspiration cytology, as well as histopathology were used as diagnostic aid contributing to preoperative planning and recurrence prevention of these tumors.

CONCLUSION

Giant Cell Tumor of the Tendon Sheath (GCTTS) requires careful differentiation from common mimics like ganglion cysts and fibromas. While radiology and cytology provide initial clues, definitive diagnosis relies on histopathology and IHC (CD68/CD45) to exclude rarer neoplasms. Although surgery offers a high curative rate, the tumor's local recurrence rate (up to 45%) necessitates complete excision and long-term follow-up. Despite its locally aggressive behaviour, malignant transformation remains exceptionally rare; thus, a multimodal diagnostic approach is vital for ensuring accurate identification and optimal surgical outcomes.

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