

Giant Cell Tumor of Tendon Sheath: Clinicopathological Correlation

Deepa Hatwal¹, Pawan Bhatt², Sheela Chaudhari¹, Neha Batra², Sachan Bhatt²

¹Associate Professor, Department of Pathology, Veer Chandra Singh Garhwali Government Medical Science and Research Institute, Garhwal, Uttarakhand, India, ²Assistant Professor, Department of Pathology, Veer Chandra Singh Garhwali Government Medical Science and Research Institute, Garhwal, Uttarakhand, India

Abstract

Background: Giant cell tumor, excluding its prototype in bone, is usually a benign but local aggressive neoplasm originating from tendon sheath or soft tissue. Malignant behavior is uncommon. Giant cell tumor of tendon sheath (GCTTS) usually originates from the membrane of tendon sheath, bursa, and joints.

Materials and Methods: All the cases of GCTTS received in Pathology Department within the duration of 5-year are reviewed for a macroscopic and microscopic picture in detail. The clinical finding regarding age, gender, tumor location, presentation and size, clinical features, and treatment modality were collected from the medical record.

Result: Of the soft tissue lesion, GCTTS were seen in 15 cases and reviewed in detail. The most common age for GCTTS was ranged from 20 to 40 years. The index finger was the most common site for giant cell tumors. On macroscopy, most of the tumors were mainly well-circumscribed, encapsulated. Microscopy shows mononuclear infiltration, macrophages, and osteoclasts such as giant cells and collagen strands. Recurrence was seen in two cases only.

Conclusion: Giant cell tumors are whether non-neoplastic or neoplastic are still controversial and need further study. A definite pre-operative diagnosis by fine-needle aspiration cytology in collaboration with radiological findings will help in proper treatment planning. All the histopathological slides must carefully look for satellite nodule, cell types, and mitotic activity to avoid recurrence.

Key words: Giant cell, multinucleated cell, thumb

INTRODUCTION

Giant cell tumor of soft tissue is very rare. Giant cell tumor of the tendon sheath (GCTTS) also called by the name of fibrous histiocytoma of synovium, pigmented nodular synovitis, tenosynovial giant cell tumor, localized nodular synovitis, benign synovioma, and fibrous xanthoma of synovium. Each of which exhibits a particular pathological feature.¹

GCTTS is a gradually developing painless soft tissue tumor is the second most common tumors of the hand, with simple ganglion cysts being the most common.^{2,3}

It can also occur in the other part of the body such as spine, ankle and knee, and feet.⁴ According to World Health Organization, 10 synovial or synovial giant cell tumors are of two types localized and diffuse form.⁵ The common localized type (giant cell tumor of synovium) is encapsulated, extra-articular, and commonly found in the tendon sheath of the fingers, whereas the rare diffuse type is non-encapsulated, intra-articular, and commonly found in the joint, considered as the soft tissue counterpart of diffuse pigmented villonodular synovitis. Pathological nature of this disease is still controversial as neoplastic or non-neoplastic.⁶ This because of the fact that recurrence rate in GCTS is reported in 45% cases.⁷ Trauma, inflammation, metabolic disease, and neoplastic etiology are considered etiological factor. Reactive and regenerative hyperplasia in GCTS is associated with an inflammatory process.⁸ The tumor is composed of oval, plump histiocytes, hemosiderin laden macrophage, multinucleated giant cell and collagen strands, and synovial hyperplasia.⁹ Histochemical evidence shows that the mononuclear cells and giant cells present

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Corresponding Author: Deepa Hatwal, S/O Dr. S K Hatwal, Health Care Hospital, Upper Bazaar, Garhwal, Uttarakhand, India.
Tel.: +01346-253501. Phone: +91-9411356980. E-mail: dhatwal@yahoo.com

in these lesions resemble osteoclast.¹⁰ Polymerase chain reaction assays have shown that GCTTS are polyclonal proliferations suggests that these masses are non-neoplastic proliferation. The common age for the tumor is between 30 and 50 years and is found more in women than in the men.¹¹ It is uncommonly occur in children. GCTTS are associated with the degenerative joint disease. The present study is comprised of clinicopathological features of GCTTS received in the Pathology Department.

MATERIALS AND METHODS

A retrospective study was conducted in the Department of Pathology, and all data were collected from medical records including the age, gender, tumor location, presentation and size, clinical features, and treatment modality.

All the specimen was received in 10% formalin. Routine tissue processing was performed on the tissue to prepare paraffin block. The histopathological slide was prepared and stained with hematoxylin and eosin stain. Sections were further examined under the microscope.

RESULTS

Of all the non-neoplastic lesions ($n = 116$) of soft tissue received in the department, the GCTTS were present in 15 cases (12.93%).

Of the 15 GCTTS, 10 (66.67%) were female and 5 (33.33%) were male. Female to male ratio is 2:1. The age ranges from 12 to 60 years. The most common location is index finger six cases (40%), in thumb four cases (26.67%), ring finger two (13.33%), metacarpal, wrist, knee one case (6.67%) each. Most of swelling was painless, and two patients presented with painful swelling. Duration ranges from 1 to 10 years. Radiographs were abnormal in two patients (Table 1).

Macroscopic

The average mean size of tumors was 3.5 cm. All the lesions were described as a well-circumscribed, capsulated, lobulated or multinodular mass, soft to firm in consistency.

Table 1: Anatomic distribution of GCTTS ($n=15$)

Location	n (%)
Index finger	6 (40.00)
Thumb	4 (26.67)
Ring finger	2 (13.33)
Metacarpal	1 (6.67)
Wrist	1 (6.67)
Knee	1 (6.67)

GCTTS: Giant cell tumor of tendon sheath

External surface was smooth (Figure 1). On a cutting cut, the surface was homogenous in 13 cases. Two cases show hemorrhage and necrosis (Figure 2).

Microscopic

Microscopy examination was characterized by the accumulation of histiocytes and presence of a multinucleated giant cell, fibrohistiocytic proliferation, hemosiderin laden macrophages, and collagen strands. Synovial cell hyperplasia seen in two cases only. No mitotic activity was reported. In follow-up, recurrence was seen in two cases only (Figures 3 and 4).

DISCUSSION

Histologically GCTTS is composed of multinucleated giant cells, polyhedral histiocytes, fibrous material, and hemosiderin deposits.^{12,13} Cellularity and mitosis does not seem to affect the prognosis of cancer.¹⁴ The neoplastic cells are accounting for 2-16% of the cell with the tumor.



Figure 1: Circumscribed, multinodular, smooth external surface of giant cell tumor of tendon sheath on gross



Figure 2: Multiple hemorrhagic areas on cut surface of giant cell tumor of tendon sheath on gross

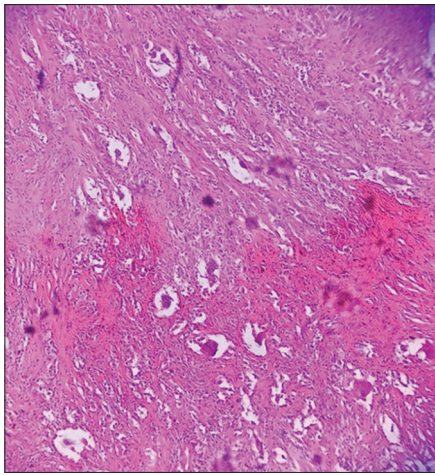


Figure 3: Giant cell tumor of tendon sheath showing multinucleated giant cell, hemosiderin macrophages, collagen strands (H and E, $\times 10$)

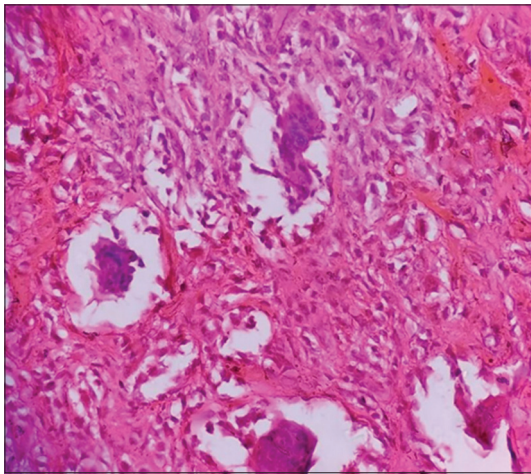


Figure 4: Giant cell tumor of tendon sheath showing mononuclear inflammation, fibrohistiocytic proliferation, and multinucleated giant cell (H and E, $\times 40$)

Jaffe *et al.*, in their study, describe GCTTS as tenosynovitis, a non-neoplastic reaction. Cytokines/hematopoietic growth factor as macrophages colony-stimulating factor (CSF1) plays an important role in the proliferation, differentiation and survival of monocytes, macrophages, and related cells. It is localized to the 1p13 breakpoint and appears to have a major oncogenic role in GCTT.¹⁵ Most of the cells are non-neoplastic, inflammatory cells recruited and activated by CSF1 produced by neoplastic cells, called as landscaping. CSF1 is a Group II receptor tyrosine kinase that shows structural homology with KIT.¹⁶

We found that age, gender, size and presenting symptoms their duration were similar with other studies. Fotiadis *et al.*, in their study, describe that GCTTS are affected more often women, with male to female ratio 1:147 and the mean age ranged from 30 to 50 years.³ In our study, the male to female ratio was 2:1. The findings of our study concurred with

the previous study except in two cases. In our study, two cases presented with 10 and 15 years. Siribumrungwong *et al.* presented a GCTTS in a 7-year-old girl in a facet joint of the thoracic spine.^{17,18} GCTTS are usually painless but when GCTTS affects other sites, it is painful.² Painless swelling of tendon sheath are reported in 84.3%, and sensory disturbances of the digits are recorded in 4.57%.¹⁹ In our case, the pain was present in two, which affect the wrist and knee, respectively.

Di Grazia *et al.*, in their study, observed the most frequent location of the tumor in the long finger (23.5%), followed by the thumb in (20.3%), index finger (20.3%), ring finger in 7.8%, and little finger 7.8%.²⁰ Fotiadis *et al.* and Briët *et al.*, in their study, found the most common location of the tumor is in index finger (29.7%) and 30%, respectively.^{3,21} The findings of our study concurred with the previous study. Radiograph plays an important role in establishing the treatment approach to the tumor. A radiograph was normal in all except two of all GCTTS. Ultrasound can be used as the first method to diagnose GCTTS and to obtain the information regarding tumor vascularity, tumor size and its relationship with the surroundings tissue.²² Fine-needle aspiration is helpful to make the tissue diagnosis pre-operatively.²³

Subcutaneous location of GCTTS from the tendon sheath and its deeper extension to neurovascular bundle makes difficulty in proper excision of the lesions. So that it could be the reason for a high recurrence rate of GCTTS.²⁴ In our study, the recurrence was seen in only two cases (13.33%). The high recurrence rate can depend on proximity to arthritic joint, proximity to distal interphalangeal joint of thumb, and radiological osseous erosion, to types of cells, to mitotic activity, capsular invasion, and incomplete excision.^{25,26}

Research is going on to find out the nature of GCTTS that whether the GCTTS is neoplastic²⁷ or non-neoplastic,⁸ its morphological and ultrastructure features,²⁸ its relation with pigmented villonodular synovitis, fibroma, and giant cell lesion of the bone.^{29,30} Many immunohistochemistry studies have been carried out to through light in the nature of the lesion.^{10,31} Fine-needle aspiration cytology (FNAC) is very useful in pre-operative diagnosis and help in pre-operative planning to prevent recurrence.³²

CONCLUSION

Giant cell tumor is whether non-neoplastic or neoplastic are still controversial and need further study. A definite pre-operative diagnosis by FNAC in collaboration with radiological findings will help in proper treatment planning.

All the histopathological slides must carefully look for satellite nodule, cell types, and mitotic activity to avoid the recurrence.

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