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# Giant cell tumor of the tendon sheath: Clinicopathologic analysis of 31 cases

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## ABSTRACT

**Aim:** To describe the epidemiological and clinicopathological findings of 31 cases diagnosed with giant cell tumor of the tendon sheath (GCTS).

**Methods:** The case records of all patients diagnosed to have GCTTS by our pathology department from 2009 to 2018 were analyzed. We introduced 31 cases of GCTTS in this study. Four cases of fibroma of the tendon sheath were excluded from the study. The age of patients, gender, site of occurrence, size of the lesion, presenting symptoms, treatment modality, histopathological reports, and recurrence were investigated, and noted.

**Results:** Ages of patients ranged from 14 to 74 years with most cases occurring in their thirties. There was a female predominance of 11 males to 20 females. The majority of patients had a painless subcutaneous palpable mass which gradually increased in size. The most frequent site of the tumor was the finger in 61.3 % (n=19). The other lesions were detected over the hand in 32.3% of the patients (n=10), foot in 3.2% (n=1), over the right knee (large joint) in 3.2% of patients (n=1). Among the small digit tumors the frequent affected site was the thumb. Single nodules (n=21) were more common than multiple (n=10). One male had maximum lesions on his left little finger with 18 GCTTS. The most common preoperative clinical diagnoses were GCTTS, fibroma, lipoma, schwannoma and epidermal cyst. Complete excision was the treatment in all of the cases. The tumors were firm/elastic, usually encapsulated, regular in shape, with smooth contour varying in size from 0.4 to 2.5 cm (average size 1.25 cm). Cut section of the tumor was grayish white mottled with yellow. Histologic appearance of the tumors consisted of multinucleated giant cells, polygonal histiocytes, foamy histiocytes and hemosiderin laden macrophages. Immunohistochemically, CD68 and ki-67 were applied in some of the patients to support the diagnosis. Local recurrence was not seen.

**Conclusions:** We must distinguish GCTTS from other similar pathological processes. A different histopathologic variation can be noticed between GCTTS involving the digits and large joints. The location and the strict adherence of the tumor to the tendon or neurovascular bundles may cause difficulties. Early diagnosis and treatment with wide excision prevent local recurrence.

**Keywords:** Giant cell tumor, tendon sheath, epidemiology, histopathology.

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## Introduction

Giant cell tumor of the tendon sheath (GCTTS) is the second most common benign tumor of the hand, following ganglion cysts. While it primarily affects the hand, it can also occur in the feet, knees, and other areas. GCTTS is a slowly growing and typically painless soft tissue lesion. The most widely accepted theories regarding its origin include trauma, infection, inflammation, osteoclastic proliferation, metabolic disease, and neoplasia [1-4]. This study describes a series of 31 cases

of GCTTS, aiming to define the epidemiological and clinicopathologic findings of the disease

## Materials and methods

We analyzed the case records of all patients diagnosed with GCTTS by pathology department from 2009 to 2018. All procedures involving human participants adhered to the ethical standards of the institutional and/or national research committee, as well as the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

This study included 31 cases of GCTTS, with four cases of fibroma of the tendon sheath excluded. We investigated and noted patient age, gender, site of occurrence, lesion size, presenting symptoms, treatment modality, histopathological reports, and recurrence. For histopathological identification, light microscopy and paraffin sections were immunohistochemically stained for CD68 antigen. Microsoft Excel was used for analysis of the simple statistical data.

## Results and Discussion

Patient ages ranged from 14 to 74 years, with most cases occurring in patients in their thirties (Table 1). There was a female predominance, with 20 females to 11 males. The majority of patients presented with a painless, subcutaneous, palpable nodule that gradually increased in size.

The most frequent site of the tumor was the finger, accounting for 61.3% (n=19) of cases. Other lesions were found on the hand in 32.3% of patients (n=10), the foot in 3.2% (n=1), and the right knee (a large joint) in 3.2% of patients (n=1) (Table 2). Among small digit tumors, the thumb was the most frequently affected site. Single nodules (n=21) were more common than multiple nodules (n=10). Notably, one male patient presented with 18 GCTTS lesions on his left little finger. The most common preoperative clinical diagnoses included GCTTS, fibroma, lipoma, schwannoma, and epidermal cyst. Complete excision was the treatment for all cases.

**Table 1.** Age ranges of the 31 patients with GCTTS.

| Age range (years) | No. of cases |
|---|---|
| 0–9 | 0 |
| 10–19 | 4 |
| 20–29 | 5 |
| **30–39** | **9** |
| 40–49 | 7 |
| 50–59 | 3 |
| 60–69 | 2 |
| 70-79 | 1 |

**Table 2.** Anatomic location of GCTTS**.**

| Location | Patients, n | Rate, % |
|---|---|---|
| Finger | 19 | 61.3 |
| Hand | 10 | 32.3 |
| Foot | 1 | 3.2 |
| Right knee | 1 | 3.2 |
| *Total:* | *31* | *100* |

The tumors were firm to elastic, usually encapsulated, and regular in shape with a smooth contour, varying in size from 0.4 to 2.5 cm (average size 1.25 cm). The cut surface of the tumor was grayish-white mottled with yellow. Histologically, the tumors comprised multinucleated giant cells, polygonal histiocytes, foamy histiocytes, and

hemosiderin-laden macrophages. Immunohistochemical staining with CD68 and Ki-67 was performed in some patients to support the diagnosis (Figure 1). No local recurrence was observed.

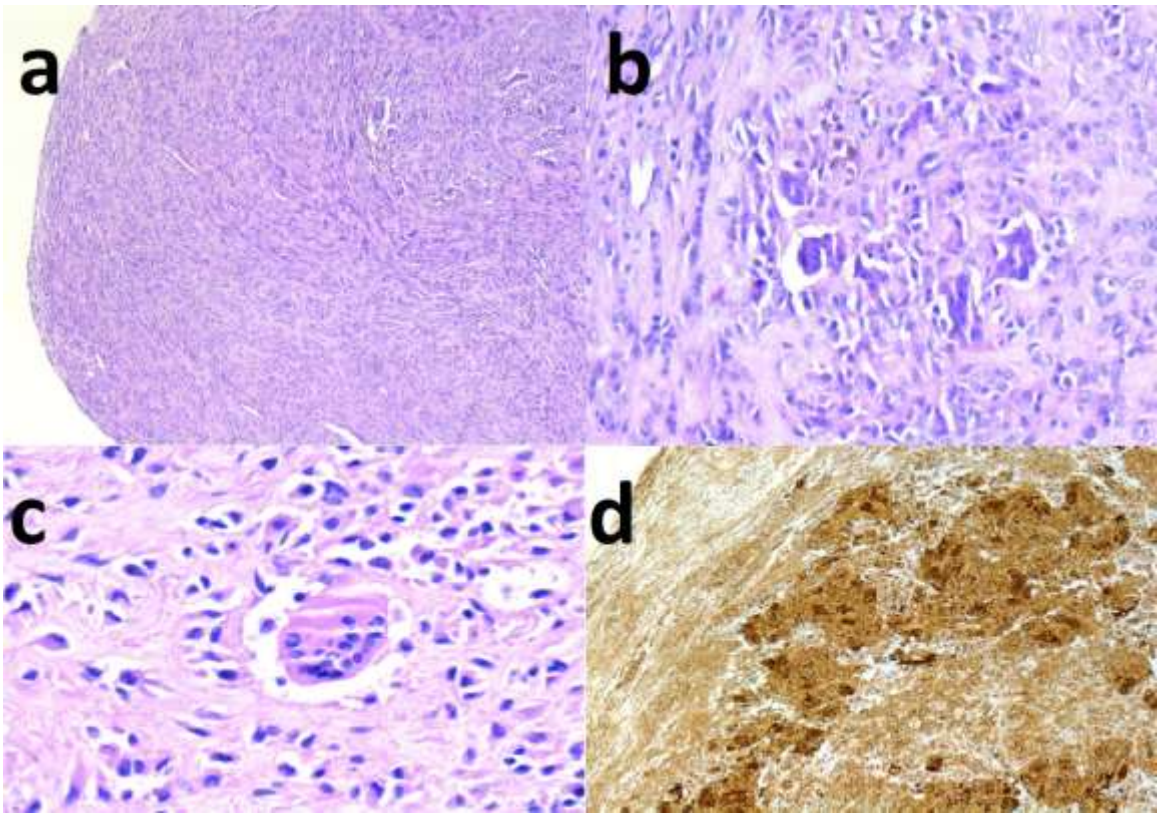


**Figure 1.** Cellular nodules are a prominent feature, often separated by a dense, collagenous stroma (**a:** H&E, ×100). Within these nodules, collections of osteoclastic giant cells alongside a mix of monoclonal round to, are seen (**b, c:** H&E, ×200; H&E, ×400). Immunohistochemistry staining (**d:** CD68, ×100).

GCTTS is characterized histologically by multinucleated giant cells, histiocytes, fibrotic material, and hemosiderin deposits. These multinucleated giant cells are formed from the fusion of histiocytes, and foam cells, common in chronic inflammation, can also be observed. Notably, the cellularity and mitotic activity of the tumor do not appear to impact its prognosis [1,2].

GCTTS typically presents as a painless mass, most often found on the flexor surface of the hand and wrist. While symptoms can range from a few weeks to up to 30 years, some individuals may experience distal numbness or mild disability [3,4].

According to Fotidias et al. [5], GCTTS more commonly affects women, with a male to female ratio of 1:1.47, and the average age of onset ranges from 30 to 50 years. The most frequent location for the tumor is the index finger (29.7%), followed by the long finger (24.6%), ring finger (16.8%), little finger (16%), and thumb (12.9%). The vast majority of patients (84.3%) report a painless swelling. Sensory disturbances in the digits are less common, occurring in about 4.57% of cases. The duration of symptoms typically ranges from 6 to 30 months, though it can extend from 1 to 120 months. Only a small percentage of patients (5%) recall a history of soft tissue trauma before the tumor's initial presentation [1,5,6].

We observed that 96.7% of our patients with small joint involvement presented with a painless subcutaneous mass that gradually

enlarged. In contrast, large joint involvement is rarer and more difficult to diagnose. It typically only becomes apparent if the swelling is painful or the joint itself is compromised, as we saw in one particular case [7].

The exact cause and cellular origin of GCTTS remain uncertain, with ongoing debate about whether it is a reactive or neoplastic lesion. The occurrence of antecedent trauma in some patients (up to 21% in one study) suggests a reactive etiology. Additionally, the microscopic appearance of GCTTS shares similarities with the synovium in degenerative joint disease, traumatic arthritis, and experimental synovitis. Histologically, the cellular components resemble histiocytes that have undergone metaplasia [7-9].

Pathologists continue to investigate GCTTS to understand its nature, morphology, ultrastructural features, and its relationship to conditions like pigmented villonodular synovitis, fibroma, and giant cell tumors of the bone [7-10].

GCTTS can sometimes be mistaken for other lesions. Small digital lesions require differentiation from granulomatous lesions, necrobiotic granulomas, and multiple giant cell tumors with a prominent xanthomatous component (often associated with hyperlipemia), as well as fibroma of the tendon sheath. A histological scoring system has been developed to distinguish GCTTS from fibroma of the tendon sheath, which is considered to be related. For larger joint tumors, differential diagnoses include synovial sarcoma, rhabdomyosarcoma, and inflammatory or xanthomatous forms of malignant fibrous histiocytoma. Pigmented villonodular synovitis, which belongs to the same family, must be differentiated from large joint GCTTS due to differing treatment approaches; it is characterized by villous proliferation and significant hemosiderin deposits. Furthermore, malignant forms of GCTTS have been identified as distinct from synovial sarcoma [7-9].

GCTTS must be distinguished from other similar pathological processes. Histopathologic variations can be observed between GCTTS affecting the digits and those in large joints. The tumor's location and its strict adherence to tendons or neurovascular bundles can present diagnostic and surgical challenges. Early diagnosis and treatment with wide excision are crucial to prevent local recurrence.

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