



Giant Cell Tumor of the Tendon Sheath: Outcome Post Excision and Recurrence Rate

Abdulmohsen F, Khan HN, Falamarzi F, Juhmani H and Mostafa M*

Department of Orthopedics, King Hamad University Hospital, Kingdom of Bahrain

***Corresponding author:** Maged Mostafa, MBBCh, MSc, MD Senior Consultant, Department of Orthopedics, King Hamad University Hospital, Medical University of Bahrain, Building 2345, Road 2835, Block 228, Busaiteen, P.O.Box 24343, Kingdom of Bahrain, Tel: +973 17 444 274/ 17 444 272; Email: maged.mostafa@khuh.org.bh

Received Date: February 12, 2024; **Published Date:** February 29, 2024

Abstract

Background: Giant cell tumor of tendon sheath (GCTTS) is a rather common hand swelling that may develop sometimes in the foot. The swelling is reported more commonly in middle-aged females. In many case series, the recurrence rate after excision is high and can reach more than 40% and the literature has discussed many possible risk factors. Our aim is to report our experience in the treatment of 20 patients having GCTTS without recurrence.

Methods: Twenty middle-aged patients diagnosed with GCTTS were treated by surgical excision. Eighteen swellings developed in the hand and two in the foot. The average duration of symptoms was 13.3 months and the average post-operative follow-up was 29.6 months.

Results: There was no single case of recurrence after surgical excision of the tumor. The functional status of the involved digit remained normal without any case of joint stiffness or injury of the neurovascular structures.

Conclusion: Complete surgical excision of GCTTS after careful identification and isolation of neurovascular structures of the digit affected, is the most important factor that can reduce the recurrence rate.

Keywords: Giant Cell Tumor; Tendon Sheath; Hand; Recurrence Rate

Abbreviations: GCTTS: Giant Cell Tumor of Tendon Sheath; PIPJ: Proximal Interphalangeal Joint; DIPJ: Distal Interphalangeal Joint; FDA: Food and Drug Administration.

Introduction

Giant Cell Tumor of Tendon Sheath (GCTTS) can be referred to as pigmented villonodular tenosynovitis or xanthofibroma, is a benign nodular tumor that is commonly arising from the tendon sheaths in the hands and reported less commonly in the feet [1]. It is the second most common soft-tissue tumor seen in the hand, following ganglion cyst [2]. It usually occurs between third and fifth decade of life [3]. The swelling appear as a firm, non-tender, non-fluctuant nodule in a digit

of the hand and most commonly develops in the index finger, followed by the long finger, thumb, ring finger, and small finger, respectively [2-5]. Diagnosis of GCTTS is largely made by clinical examination and can be proved with MRI; which is the preferred imaging modality [6]. In this study, we are presenting our experience in treating 20 cases of GCTTS of hand and foot resulting in zero incidence of recurrence.

Materials and Methods

A total of twenty adult patients, five males and fifteen females, were involved in this study that took place between 2017-2022. The mean age of the study population is 50 years (range, 29-71 years). Patient's characteristics are

summarized in Table 1. Eighteen tumors occur in the hand and two patients had the swellings in the foot. The mean duration of symptoms from the onset until presentation to the clinic is 13.3 months (range 3-36 months). Sixteen

patients out of the twenty cases in this study, visited the orthopedic clinic as they were worried about the nature of the swelling in their fingers while two patients had mild pain with overuse.

Demographic Details of the Patients		
Age	<40 years:	6 patients (30%)
	>40 years:	14 patients (70%)
Sex	Female:	15 patients (75%)
	Male:	5 patients (25%)
Region	Hand swellings:	18 patients (90%)
	Foot swellings:	2 patients (10%)
Anatomical location	Hand PIPJ:	15 cases (75%)
	Hand DIPJ:	3 cases (15%)
	Foot interphalangeal joint:	1 case (5%)
	Foot metatarsophalangeal joint:	1 case (5%)
Duration of swelling	<12months:	9 patients (45%)
	>12months:	11 patients (55%)
Bone involvement	Pressure atrophy of the phalanx:	3 cases (15%)
Direction of growth	Hand volar aspect:	14 cases (70%)
	Hand dorsal aspect:	1 case (5%)
	Combined volar and dorsal:	3 cases (15%)
	Foot dorsal aspect:	2 cases (100% of foot lesion, 10% of GCTT)
Recurrence	Recurrence rate:	0%

Table 1: Demographic details of the patients.



Figure 1A



Figure 1B



Figure 1C



Figure 1D

Figure 1A-C: Giant cell tumor of the big toe enclosing extensor hallucis longus tendon. **Figure 1D:** Characteristic gross appearance of GCTTS.

Regarding the two cases of GCTTS in the feet (10%), one had relatively big swelling on the dorsal aspect of the interphalangeal joint of the big toe (Figure 1A-C) and the other patient had a lesion over the metatarsophalangeal joint of the little toe. Both patients pre-operatively had discomfort with shoe wear due to the pressure over the swelling, but the tumor itself developed as a painless mass. On clinical examination of the patients involved in our study, the tumors of the hand or feet were firm, non-tender, not attached to the overlying skin, and showed limited mobility.

In hands, the tumors were located in the region of the proximal interphalangeal joint (PIPJ) in 15 cases (75%) and near the distal interphalangeal joint (DIPJ) in 3 cases (15%). All patients pre-operatively had normal sensation over the tips of the fingers with normal range of motion. Plain radiographs of hands and feet were performed for all patients and did not show any bone destruction or involvement.

However, in three cases, there was pressure atrophy over the volar aspect of the phalanx close to the swelling. MRI studies of the swellings were routinely done except in four patients with hand tumors who were not compliant with the technique of this imaging modality.

Surgery of all the cases was performed by the senior author and it involved primarily careful and meticulous isolation of the neurovascular bundle of the involved digit followed by complete excision of the swelling. Bruner incision was used for excision of volar hand swellings, however, in three cases midlateral skin incision was preferred to deal with tumors on volar aspect of the fingers with nodular dorsal extension (Figures 2 A-D). All patients involved in this study with hand swellings were allowed free range of motion of the digit on the third post-operative day after change of dressing and sutures were removed 2 weeks post operatively.



Figure 2A

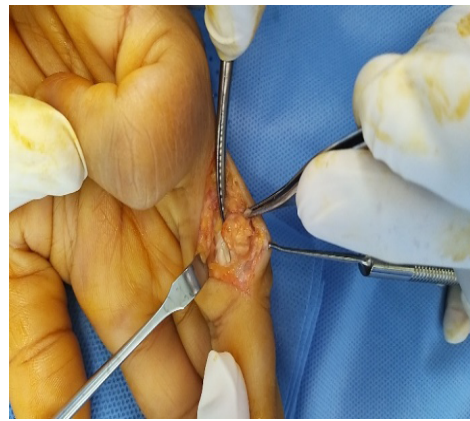


Figure 2B

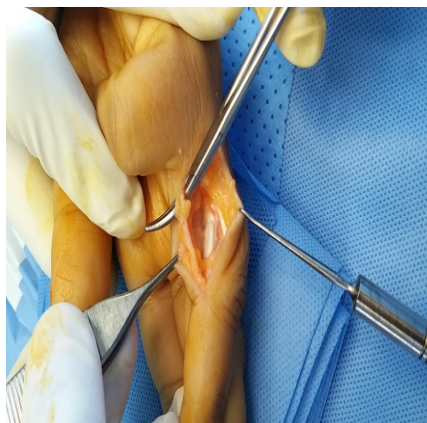


Figure 2C



Figure 2D

Figure 2A-D: GCTTS of the finger involving the flexor (volar) and extensor (dorsal) tendons. Mid lateral incision was necessary for complete tumor excision.

On gross examination of the swellings, all showed the characteristic dark greyish brown color, with multinodular nature, some areas were firm and others were soft in consistency (Figure 1: D) Histopathological examination revealed a well circumscribed partially encapsulated lesion composed of a diffuse mononuclear cellular infiltrate of spindled and histiocyte-like cells admixed with osteoclast-like giant cells, in a dense collagenous stroma. No necrosis or cytological atypia is detected. The lesion is seen at the inked margins. The morphological features were consistent with the clinical impression of a giant cell tumor of tendon sheath.

Results

Follow up period ranged between 12 and 72 months with an average of 29.6 months. We did not encounter any case of recurrent swelling during monitoring of the patients and also they retained the preoperative functional status. In this review of 20 cases, there was no report of any complications related to surgical site infection, neurovascular injury, or stiffness of the joints.

Discussion

Giant Cell Tumor of Tendon Sheath (GCTTS) is not uncommon swelling of the hand, this is commonly seen in patients aged 30-50 years and rarely reported in patients younger than 10 years or older than 60 years [6]. The ratio of incidence between females and males is 3:2 which agrees with our findings, as female patients formed 75% of the series.

In 2019 Tap WD, et al. [7], pexidartinib was approved by the US food and drug administration (FDA) to be the first systemic therapy for GCTTS. The initial studies showed a reasonable response to the treatment therapy that was maintained for one year; however, in 2022 Verheyden JR, et al. [6], FDA lowered the dose to reduce hepatotoxicity. We have no experience with such a new trend of therapy, particularly we achieved good results with surgical treatment avoiding long term adverse effects of the drug. Jones FE, et al. [8] in their study 118 cases of GCTTS, only 3 percent were present in the foot. We found similar incidence in the current study of 20 cases where 10 present were only in the foot. The dorsal aspect is usually affected more than the plantar aspect and the tumor can arise from a tendon sheath as the tibialis posterior tendon, flexor digitorum longus, extensor hallucis longus tendon and slips of the extensor digitorum longus to

small toes. Similarly, in our study the extensor tendons of little and big toes were involved.

Plain radiograph is an important imaging modality to show cortical erosions or invasions Karasick D, et al. [9], but MRI is more useful for detailed anatomical assessment of the lesion and can help to reach the pre operative diagnosis depending on characteristic MRI features of GCTTS [10]. MRI shows the swelling as soft tissue nodule with intermediate T1 and low T2 signal and is bright in STIR sequence with homogeneous post contrast enhancement. Recurrence is a major concern after excision, it was reported to be 9 percent among 56 cases of Phalen GS, et al. [11], 17% of 95 patients in the study of Jones FE, et al. [8] and 44 % in the series of Wright CJ [12]. The reported risk factors that could increase incidence of tumor recurrence after excision include: cortical destruction, proximity to the DIP joint, presence of degenerative joint disease, dissection of neurovascular structures and incomplete excision [13-16].

We disagree with the opinion of Williams J, et al. [15] who believed that involvement of flexor and extensor tendons increase the recurrence rate, as all hand cases of this study were related to those tendons and part of tendon sheath was always excised with the tumor. Also, we do not support the statement of Kitagawa Y, et al. [17] who mentioned the proximity to neurovascular bundle interfere with complete excision of the tumor and increases the recurrence rate. It is a routine step in our protocol to isolate carefully the neurovascular structures before proceeding to excise the swelling and we did not face recurrence of the 20 masses excised during the follow up period that was on average 29 months (Figure 3: A-D). Our findings mimic those of Ozben H, et al. [2] and Lowyck H, et al. [18] that bone involvement was simple pressure atrophy of the cortex adjacent to the swelling due to its size and chronicity. We had this finding in 3 cases and there was no recurrence after excision. However, we did not come across situations of bony destruction or invasion that Reilly KE, et al. [19] reported, they found cases of recurrence out of 8 with bone erosions.

Post-operative radiotherapy was introduced as a tool to reduce the recurrence rate. Depending on our results we agree with the findings of Kotwal PP, et al. [20] that this treatment modality maybe justified in cases where complete excision was not possible.

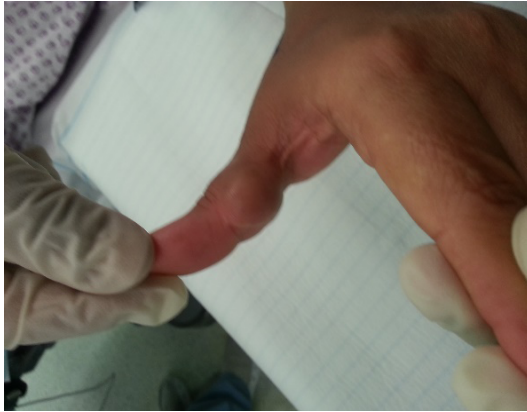


Figure 3A



Figure 3B



Figure 3C



Figure 3D:

Figure 3A-D: GCTTS arising on the volar aspect of the thumb. Careful isolation of the neurovascular structures was mandatory for complete tumor excision.

Conclusion

Giant Cell Tumor of Tendon Sheath (GCTTS) must be excised by surgeons who are familiar with the hand detailed anatomy. Complete surgical removal is the primary factor to avoid the high incidence of recurrence reported in the literature. This must be preceded by proper preoperative investigations and associated with careful surgical dissection to get the mass excised without harming the vital structures or missing residual nodules.

Acknowledgment: None

Conflict of interest: No conflict of interest for any of the author.

References

1. Zhang Y, Huang J, Ma X, Wang X, Zhang C, et al. (2013) Giant Cell Tumor of the Tendon Sheath in the Foot and Ankle: Case Series and Review of the Literature. *J Foot and Ankle Surg* 52(1): 24-27.
2. Ozben H, Coskun T (2019) Giant Cell Tumor of Tendon Sheath in the Hand: Analysis of Risk Factors for Recurrence in 50 Cases. *BMC Musculoskelet Disord* 20: 457.
3. Ushijima M, Hashimoto H, Tsuneyoshi M, Enjoji M (1986) Giant Cell Tumor of the Tendon Sheath (Nodular Tenosynovitis). A Study of 207 Cases to Compare the Large Joint Group with the Common Digit Group. *Cancer* 57(4): 875-884.
4. Gouin F, Noailles T (2017) Localized and Diffuse Forms of Tenosynovial Giant Cell Tumor (Formerly Giant Cell Tumor of the Tendon Sheath and Pigmented Villonodular Synovitis). *Orthop Traumatol Surg Res* 103(1S): S91-S97.
5. Adams El, Yoder EM, Kasdan ML (2021) Giant Cell Tumor of the Tendon Sheath: Experience with 65 Cases. *Eplasty*

- 12: e50.
6. Verheyden JR, Gellman H (2022) Giant Cell Tumor of Tendon Sheath. Medscape.
7. Tap WD, Gelderblom H, Palmerini E, Desai J, Bauert S (2019) Pexidartinib for Advanced Tenosynovial Giant Cell Tumor: Results of the Randomized Phase 3 ENLIVEN Study. *Lancet* 394(10197): 478-487.
8. Jones FE, Soule EH, Coventry MB (1969) Fibrous Xanthoma of Synovium (Giant-Cell Tumor of Tendon Sheath, Pigmented Nodular Synovitis): A Study of One Hundred and Eighteen Cases. *JBJS Am* 51(1): 76-86.
9. Karasick D, Karasick S (1992) Giant Cell Tumor of Tendon Sheath: Spectrum of Radiologic Findings. *Skeletal Radiology* 21: 219-224.
10. Wan JM, Magarelli N, Peh WCG, Guglielmi G, Shek TWH (2010) Imaging of Giant Cell Tumor of the Tendon Sheath. *Radial Med* 115(1): 141-151.
11. Phalen GS, McCormack LJ, Gazale WJ (1959) Giant-Cell Tumor of Tendon Sheath (Benign Synovioma) in the Hand: Evaluation of 56 Cases. *Clin Orthop* 15: 140-151.
12. Wright CJ (1951) Benign Giant-Cell Synovioma. An Investigation of 85 Cases. *Br J Surg* 38(151): 257-271.
13. Al-Qattan MM (2001) Giant Cell Tumours of Tendon Sheath: Classification and Recurrence Rate. *J Hand Surg Br* 26(1): 72-75.
14. Fotiadis E, Papadopoulos A, Svarnas T, Akritopoulos P, Sachinis NP, et al. (2011) Giant Cell Tumour of Tendon Sheath of the Digits. A Systematic Review. *Hand (N Y)* 6(3): 244-249.
15. Williams J, Hodari A, Janevski P, Siddiqui A (2010) Recurrence of Giant Cell Tumors of the Hand: A Prospective Study. *J Hand Surg Am* 35(3): 451-456.
16. Messoudi A, Fnini S, Labsaili N, Ghrib S, Rafai M, et al. (2007) Giant Cell Tumors of the Tendon Sheath of the Hand: 32 Cases. *Chir Main* 26(3): 165-169.
17. Kitagawa Y, Ito H, Yokoyama M, Sawaizumi T, Maeda S (2004) The Effect of Cellular Proliferative Activity on Recurrence and Local Tumour Extent of Localized Giant Cell Tumour of Tendon Sheath. *J Hand Surg Br* 29(6): 604-607.
18. Lowyck H, Smet LD (2006) Recurrence Rate of Giant Cell Tumors of the Tendon Sheath. *Eur J Plast Surg* 28(6): 385-388.
19. Reilly KE, Stern PJ, Dale JA (1999) Recurrent Giant Cell Tumors of the Tendon Sheath. *J Hand Surg Am* 24(6): 1298-1302.
20. Kotwal PP, Gupta V, Malhotra R (2000) Giant-Cell Tumour of the Tendon Sheath: Is Radiotherapy Indicated to Prevent Recurrence After Surgery?. *J Bone Joint Surg Br* 82(4): 571-573.