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Case Series

Management of Giant Cell Tumor of Tendon Sheath of Phalanx and Its Outcome: Case Series

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Abstract

Introduction: Giant cell tumor of the tendon sheath (GCTTS) is a benign soft-tissue tumor of the hand. Despite its non-malignant nature, recurrence remains a concern. Complete excision of the lesion, including any satellite nodules, is important in reducing the risk of recurrence. The use of a magnifying loupe may facilitate meticulous dissection and complete removal of the lesion.

Aim: To evaluate the surgical management and clinical outcomes of giant cell tumor of the tendon sheath of the hand.

Materials and Methods: This was an observational case series conducted in the Department of Plastic and Reconstructive Surgery, PMCH, Patna, over an 18-month period (2024–2025). A total of 10 patients with GCTTS were surgically treated after preoperative confirmation by fine-needle aspiration cytology (FNAC). Meticulous dissection and tumor excision were performed with the aid of a magnifying loupe. Patients were subsequently contacted for follow-up and clinical assessment.

Results: A total of 10 patients, comprising six females and four males, with a mean age of 29.5 years (range, 22–53 years), underwent excision of GCTTS of the hand. The lesions were located over the thumb (n = 3), index finger (n = 3), ring finger (n = 1), middle finger (n = 1), and hand (n = 2). The lesions were classified according to the Al-Qattan classification. A mass involving the phalanx, particularly the thumb and index finger, was a common presentation. Postoperative complications included infection (n = 1), skin necrosis (n = 1), neurovascular injury (n = 1), and stiffness (n = 3). Recurrence was observed in one patient (10%).

Conclusion: Successful management of GCTTS requires adequate surgical exposure, meticulous dissection, and complete excision of the tumor, including satellite lesions. Preoperative FNAC may assist in diagnosis and surgical planning, while loupe-assisted dissection may facilitate careful identification and removal of the lesion. Regular postoperative follow-up is important for early detection of recurrence.

Keywords: Giant cell tumor of tendon sheath; GCTTS; Hand tumor; Benign soft-tissue tumor; Surgical excision; Magnifying loupe; Fine-needle aspiration cytology; Recurrence.

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Introduction

Giant cell tumor of the tendon sheath (GCTTS) is a benign, slowly growing soft-tissue tumor that commonly affects the hand and develops gradually over months or years. It is considered the second most common tumor of the hand. The exact etiology remains uncertain, although several factors, including trauma, inflammation, metabolic disorders, and neoplastic processes, have been proposed in its development [1–3].

Although GCTTS is a benign lesion, local recurrence remains an important concern following surgical excision. Several factors have been associated with recurrence, including involvement of the distal interphalangeal joint, degenerative joint changes, pressure-related bony erosion on radiographs, increased mitotic activity, and the presence of multifocal lesions according to the Al-Qattan classification [1,3–5]. Complete surgical excision remains the mainstay of treatment and is considered the most important factor in reducing recurrence.

Particular attention should be given to the identification and removal of satellite or multifocal nodules, which may be difficult to detect during routine dissection [6–8]. The use of magnifying loupes or an operating microscope can improve

visualization of the lesion and facilitate meticulous dissection, particularly when the tumor is closely related to important anatomical structures [6,7]. Preoperative tissue diagnosis may also assist in surgical planning. Fine-needle aspiration cytology (FNAC) can help establish a preoperative diagnosis of GCTTS and allow the surgeon to anticipate the lesion during operative dissection [9]. Careful preoperative assessment, adequate surgical exposure, meticulous dissection, and complete removal of the tumor are therefore important to minimize the risk of recurrence.

In the present case series, we describe the surgical management of GCTTS of the hand and evaluate the postoperative clinical outcomes, including complications, functional recovery, and recurrence.

Materials and Methods

Study Design and Setting: This observational case series was conducted in the Department of Plastic and Reconstructive Surgery, Patna Medical College and Hospital (PMCH), Patna, over an 18-month period from 2024 to 2025. A total of 10 patients with giant cell tumor of the tendon sheath (GCTTS) of the hand were included in the study.

Clinical Evaluation: All patients underwent a detailed clinical assessment, including evaluation of the site and characteristics of the lesion, relevant history, and examination of the affected hand. A history of previous trauma was documented. The age and sex of the patients and the anatomical location of the tumor were recorded.

Preoperative imaging included plain radiography of the affected area and ultrasonography. Fine-needle aspiration cytology (FNAC) was performed in all patients to establish a preoperative diagnosis. The cytological specimens were assessed by a histopathologist for the presence of characteristic giant cells and other features suggestive of GCTTS**.**

Surgical Technique : All patients underwent surgical excision of the tumor under Bier block anesthesia with tourniquet control. A magnifying loupe was used during the procedure to facilitate detailed visualization and meticulous dissection.

The tumor was carefully dissected and completely excised while preserving the surrounding neurovascular structures and other important anatomical tissues. Particular attention was given to identifying any satellite lesions or additional nodules within the operative field, which were excised when identified. The excised specimen was sent for histopathological examination, including assessment of the resection margins, to confirm the diagnosis and evaluate the completeness of excision.

Tumor Classification: The tumors were classified according to the Al-Qattan classification system based on their morphological characteristics and pattern of involvement.

Postoperative Follow-up and Outcome Assessment: Patients were followed postoperatively for assessment of wound healing, range of motion, functional recovery, and patient satisfaction. Postoperative complications, including wound infection, skin necrosis, neurovascular injury, and joint stiffness, were documented. Patients who developed stiffness were managed with physiotherapy.

Recurrence of the tumor during follow-up was also recorded. Patients who had undergone surgery were contacted by telephone and invited for follow-up clinical assessment.

Ethical Considerations: The study was conducted in accordance with institutional ethical standards. Patient confidentiality was maintained, and clinical photographs used for academic or publication purposes were obtained with appropriate consent.

Results

Over 18 months period starting in 2024, a total of 10 patients [6 females, 4 males, average age 29.5, with ages ranging from 22 to 53 years] had excisions of giant cell tumors of the tendon sheath in the hand. The tumors were located on the thumb [n = 3], ring finger [n = 1], index finger [n = 3], and on the hand [n = 2].

Results were assessed based on complications, range of motion, and patient satisfaction with functionality. The complications recorded included infection (n = 1), skin necrosis (n = 1), neurovascular injury (n = 1), stiffness (n = 3), and recurrence (n = 1). There was one case of superficial wound infection that was treated effectively with antibiotics. Physiotherapy was administered for three cases that displayed joint stiffness.

Table 1: showing site of GCT

Site of GCT	n
Thumb	3
Ring finger	1
Middle finger	1
Index finger	3
Hand	2

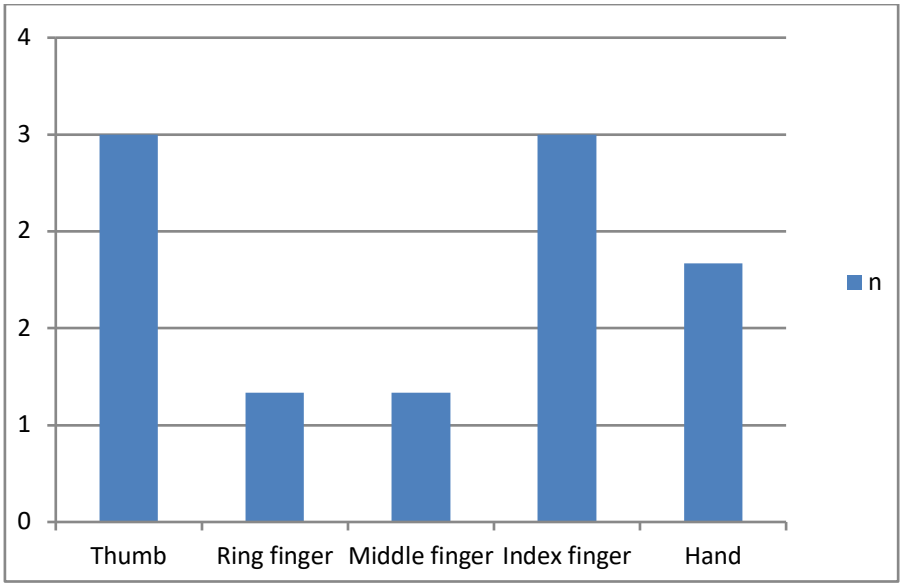

Figure 1: showing site of GCT

Table 2: showing post-operative complication fallowing GCT excision

Complication	n
Infection	1
Skin necrosis	1
Neuromuscular damage	1
Stiffness	3
Recurrence	1

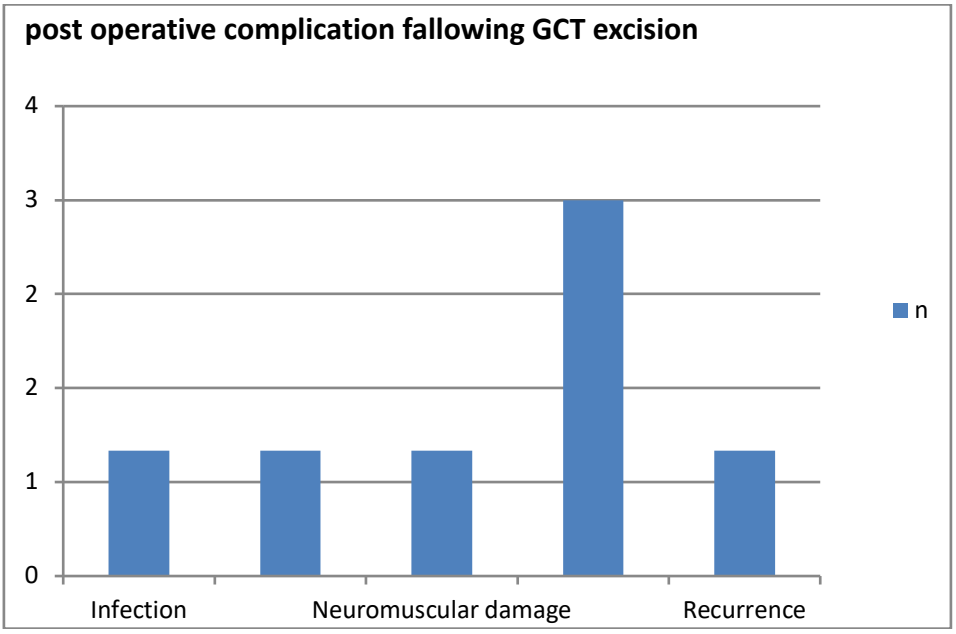

Figure 2: Showing post-operative complication fallowing GCT excision

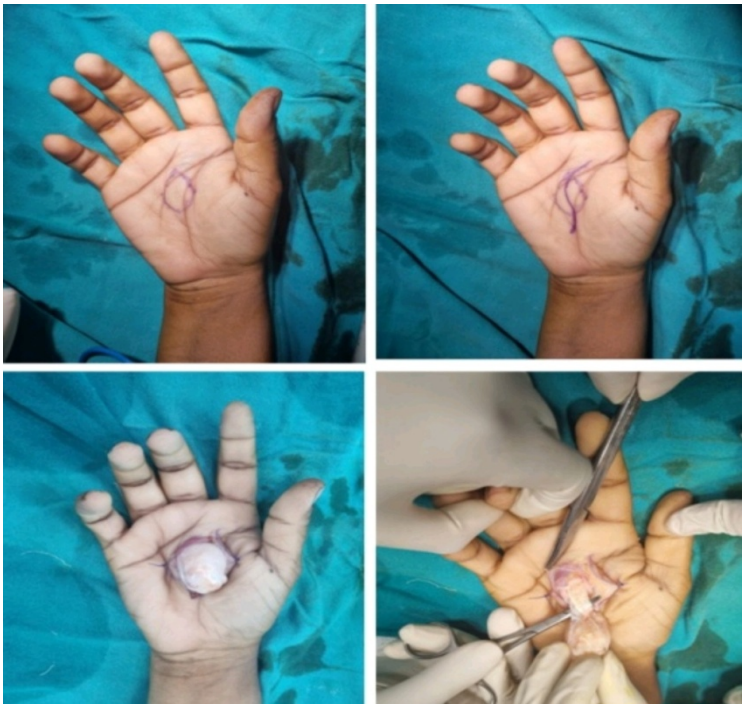

Figure 3: showing Intraoperativepicure of GCT Excision of Hand

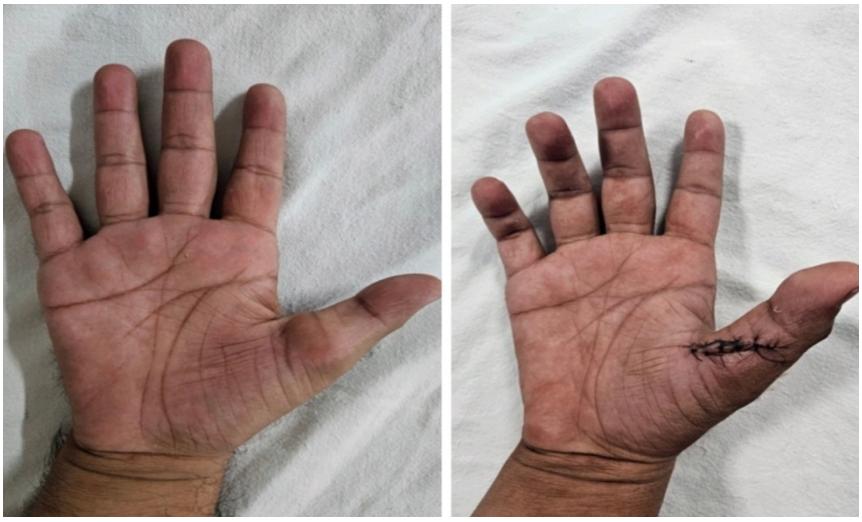

Figure 4: showing pre-operative and post-operative Picture of GCT of Thumb

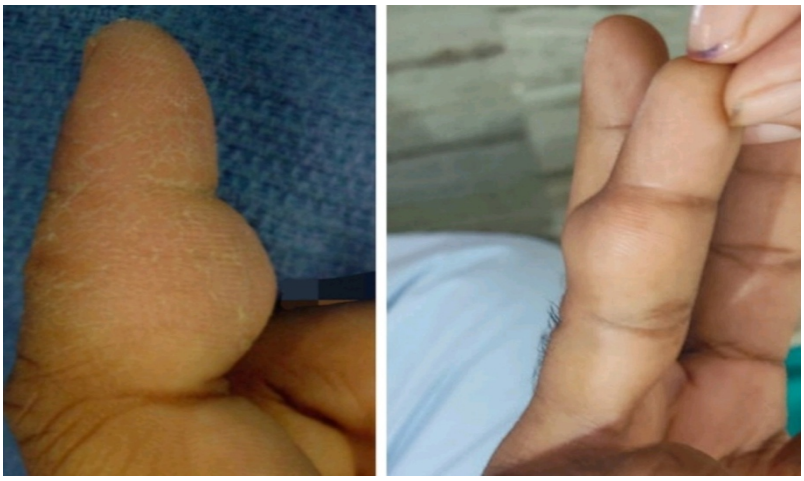

Figure 5: showing picture of GCT of Index Finger

Discussion

The reported recurrence rate for GCTTS is 20% [3, 5, 6], while some authors have noted rates as high as 45% [2, 4, 8]. Several factors have been identified as predictors of recurrence. This encompasses pressure erosions visible on X-rays, their position at the interphalangeal joint, and the existence of degenerative joint disease. Lowyck and De Smet [2] discovered that there was no significant link between recurrence and the presence of pressure erosions or degenerative joint disease. They also found no link between recurrence and lesions in the distal interphalangeal joint [2]. Al-Qattan noted that a bony indentation caused by pressure from an overlying tumor should not be regarded as intraosseous invasion and is not linked to an increased risk of recurrence [1]. The increased likelihood of recurrence in the distal joint could result from challenges in fully removing the lesion because of restricted space [3].Al Qattan has examined the recurrence following surgical removal. He has introduced a new classification system for GCTTS, categorizing Type I as a single tumor that is either round or multi-lobulated, and Type II as two or more separate tumors that are not connected [1]. Al-Qattan's new classification is helpful for predicting recurrence, as satellite lesions are frequently overlooked without the use of a magnifying loupe, particularly in Type IIa and Type IIb lesions [1, 10].Microscopic excision has been described to prevent recurrence [7].In our study, there is recurrence in 1 case. Ikeda reported recurrence in only one case of 18 reported when they used the operating microscope. In the only case of recurrence, the case recurred as microscope was not used. Ozalp [8] recommends using a magnifying loupe to excise the satellite lesions after excision of the nodules. Complete excision with help of operating microscope or a magnifying loupe has been advocated by many authors who got promising results [7, 8], as complete surgical excision is the only factor which has been proved to prevent recurrence.

Histologically, these tumors consist of multinucleated giant cells, polyhedral histiocytes, fibrous tissue, and hemosiderin deposits [8, 12, 13]. However, Rao and Vigorita [5] discovered a high rate of recurrence in tumors exhibiting elevated mitotic activity. Initially, there was no connection between the number of mitoses observed and the likelihood of recurrence, although all recurring lesions exhibited higher mitotic activity [5]. However, studies conducted by Monaghan and colleagues. Research has demonstrated that mitotic figures are not a sign of recurrence and supports complete local excision as the preferred treatment [14]. Complete surgical removal continues to be the primary treatment method, supported by either an operating microscope or a magnifying loupe. Radiotherapy is recommended following incomplete removal and for patients exhibiting high mitotic activity to reduce the risk of recurrence [4]. They noted a recurrence rate of just 4% using this management approach. Ozalp et al. recommend excision even in cases of multiple recurrences. and recurring tumors were not treated with radiotherapy [8].There is a growing trend to use FNAC as a main diagnostic tool, aiding in the management of soft tissue masses [17]. In most cases, management decisions regarding soft tissue masses can be made based on cytological analysis, according to the authors [17]. The diagnosis of GCTTS can be made before surgery using FNAC, aiding in preoperative planning to avoid recurrence [9]. Incomplete removal of the tissue and the presence of remaining satellite nodules is regarded as the key factor influencing the recurrence pattern. Proper surgical exposure, careful dissection, and the use of magnification are essential to minimize recurrence and should continue to be the primary approach in surgical treatment.

Following the previously mentioned surgical procedure, the authors were able to fully remove the tumor, with recurrence observed in only one case [8.3%]. Kitagawa et al. (2004) examined the association between tumor involvement and digital neurovascular bands, noting an increased rate of occurrence and suggesting that the proximity of the tumor to neurovascular structures complicates complete removal and may contribute to recurrence. Di Grazie and colleagues found 3 recurrences out of 7 cases involving neurovascular structures, whereas Ozben and colleagues noted in their study that the complexity of neurovascular involvement did not raise the risk of recurrence. One patient from our recurrence group had involvement of the digital neurovascular bundle.

Conclusions

Giant cell tumor is slow growing lesion of tendon sheath. Magnetic resonance imaging serves as a diagnostic method for identifying the location, extent, growth patterns of a lesion, and aiding in preoperative planning. The tumor is associated with a high rate of recurrence across various patient populations. Therefore, it is essential to reduce the risk factors for recurrence by completely removing the tumor, performing dissection under a surgical loop to identify and eliminate satellite lesions, preserving neurovascular structures, reconstructing the pulley system, and administering postoperative radiotherapy when patients have heightened risk factors or incomplete removal of the mass. Patients should be made aware that the tumor has a high likelihood of recurring, even after complete removal, and this possibility should be taken into account during follow-up examinations.

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