Full length article

Giant cell tumour of tendon sheath and synovial membrane: A review of 26 cases

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ABSTRACT

Aim: Aim of our study is to highlight the incidence and benign nature of Giant cell tumour of tendon sheath and need for complete removal, thus minimizing the chances of recurrence.

Material and methods: A total of 26 cases of Giant cell tumour of tendon sheath operated in the department of Orthopaedics, Patna Medical College & Hospital, Patna from 2003 to 2010 were included in this study. The surgery was performed after clinical evaluation of the lesion and Fine Needle Aspiration Cytology (FNAC). The tumour underwent en bloc marginal excision. The patients were followed up for minimum two year.

Results: Our study population consisted of 18 females and 8 males. The mean age at the time of surgery was 38.3 years (range, 18–62 years). Twenty three cases were found in the 3rd and 4th decade. Twenty two cases involved upper extremity and only 4 cases in lower extremity. MRI was done in 2 cases where diagnosis was in doubt. Bony indentation on X-ray film was found in 7 cases and thorough curettage of cortical shell was done. All the cases were treated by marginal excision. Three cases developed post-operative stiffness but regained full range of movement with physiotherapy. Sensory impairment was seen in 3 cases. Recurrence occurred in 2 case and they were treated by repeat marginal excision.

Conclusion: Meticulous en-masse marginal excision of the giant cell tumour of tendon sheath in blood less field using magnification is the treatment of choice.

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1. Introduction

Giant cell tumour of the tendon sheath (GCT-TS) is the second most common tumour in the hand, after ganglion cysts.¹ It usually presents as a painless, firm, well defined nodule on the dorsal or volar side of the finger, generally located proximally to the distal inter-phalangeal joint.²

Giant cell tumour of the tendon sheath (GCT-TS) is a disease of disputed etiology and pathogenesis.³ Trauma, inflammation, metabolic disease and neoplastic etiology are considered as its etiological factors.^{4,5} GCT-TS was considered to be a neoplasm arising from the lining and sublining cells of the tendon sheath.^{1,6}

Studies demonstrating cytogenetic abnormalities⁷ (aneuploidy DNA, high proliferative rate), the natural behavior of local recurrences and multifocality¹ has raised the idea that GCT-TS is a neoplasm. Clonal chromosomal aberrations were observed suggesting a neoplastic etiology in one study,⁸ however, Recently some investigations indicate a neoplastic origin of the tumors; others indicate that they are polyclonal and inflammatory. The cytogenetic and molecular genetic features of GCT-TSs are still largely unknown.^{3,9}

Radiographically, it presents as a soft-tissue mass that may cause a bone impression on the volar face of the adjacent phalanx due to pressure effect. Sometimes it resembles an intraosseous lesion, i.e. cortical or intramedullary, well defined and osteolytic. True bone invasion occurs in around 5% of the cases.⁶ Ultrasonography shows a solid, homogeneous, hypoechoic mass generally in relation to the flexor tendons of the fingers, with increased vascularity on Doppler studies.¹⁰ Magnetic resonance imaging reveals decreased signal intensity on T1- and T2-weighted images.^{9,11}

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There is no certain treatment protocol but complete local excision is the treatment of choice. Recurrence is a major concern in GCT-TS, with rates of up to 44% being reported.⁵ In the case of recurrence, marginal excision of the tumour should be repeated. Functionality of the involved digit should be considered and may result in the decision to amputate for large tumors that interfere with function.

The aim of the present study is to highlight the misdiagnosis of giant cell tumors of tendon sheath as synovial ganglion which are treated by less experienced surgeons by local injection and/or incomplete removal resulting in recurrence.

2. Material & methods

This retrospective study was conducted in the Department of Orthopaedics, Patna Medical College & Hospital. A total of 26 cases of GCT-TS operated by the senior surgeon from 2003 to 2010 were included in this study.

Preoperatively patients were evaluated clinically and radiologically. Prior to surgery FNAC was done in all cases for diagnosis. All cases were operated under regional or general anaesthesia. Pneumatic tourniquet was used to achieve bloodless field however exsanguination was not done before inflation so that vessels remain prominent. In case of large tumour lazy S incision was used for complete access and en masse excision of the tumour. In two of our cases tumour was encircling more than two third circumference of the digit and in these cases double (volar and dorsal) incision was used to completely excise the tumour. The tumour underwent meticulous en bloc marginal excision (Fig. 1A–C) and was sent for cytopathological examination for confirmation of diagnosis. In cases of bony erosion thorough curettage of cortical shell was done. The patients were followed up for a mean period of 4.3 years (range 3–6 years).

3. Results

Our study population consisted of 18 females and 8 males. The mean age of the patients at the time of surgery was 38.3 years (range 18–62 years). Twenty three cases were found in the 3rd and 4th decade. Only 1 case was found in 2nd, 5th and 7th decade each. Twenty two cases were found in upper extremity and only 4 cases were found in lower extremity. (Fig. 2) Foot preponderance was seen in men.

Five cases in our series were wrongly diagnosed as a case of synovial cyst (ganglion cyst) before presenting to us and were primarily treated by steroid injection in the lesion.

Out of the 26 cases FNAC was positive for giant cells in 24 cases, whereas in 2 cases it was inconclusive. MRI was done in these 2 cases to know the nature & extent of tumour. Bony indentation was found in 7 cases in our series, all these tumours were of large size. (Fig. 1D) All the cases were treated by marginal excision. Thorough curettage of the cortical shell was done in cases with bony involvement to prevent recurrence. In case of large tumours, liberal preservation of skin was done.

There was superficial wound infection in 2 cases which responded to wound care under antibiotic cover. Two cases in the thumb and one in the little finger developed post-operative stiffness but regained full range of movements with physiotherapy. Sensory impairment was seen in 3 cases which were due to involvement of digital nerves during dissection. Recurrence occurred in 2 case and they were treated by repeat marginal excision with no further recurrence in available follow up. Both these patients were having large multinodular tumour initially and recurred mass appeared as a small swelling which increased in size gradually in close proximity to primary site of lesion.

4. Discussion

Jaffe et al. regarded the synovium of the tendon sheath, bursa and joint as an anatomical unit in which giant-cell tumour of the tendon sheath, also called pigmented villonodular synovitis, may occur.¹² According to the World Health Organization classification system for bone and soft tissue tumours, it is classified as a “fibrohistiocytic tumour.”¹³ It can be divided into localized nodular type (common in hand) and diffuse type (common in joints). Diffuse form is hyper cellular with several giant cells, while localized form is relatively hypocellular with numerous giant cells. Another classification proposed by Al Qattan classified GCT-TS into Type I (single tumour, round and multi-lobulated) and Type II (two or more distinct tumours, not joined together).¹⁴ Type II is more often related with recurrence as satellite lesions when microscopic excision is not done.

In our study, we found female preponderance (70% cases). Cases mostly belonged to 3rd and 4th decades. Most of the cases in our series showed involvement of upper extremities. The most frequent location of GCT-TS is the hand, especially the fingers and in many cases, it involves the volar surface of the fingers more often than the dorsal one. The tissue mass expands areas of least resistance.¹⁵ There were 4 cases (15%) seen in foot. Out of these 4 cases, 3 were found in males. The presenting symptom in most of our patients was painless swelling for many years. This is

Fig. 1. (A) Digital nerve (black arrow) and vessels (white arrow) snugly adhered with tumour mass. (B) Neurovascular bundle meticulously dissected and protected (white arrow). (C) en-block dissection of multiple nodular lesions (white arrow). (D) Radiograph showing indentation of volar aspect of proximal phalanx with cortical erosion.

Fig. 2. (A–B) GCT-TS of 3rd toe almost completely encircling the proximal phalanx. (C–D) Double incision both volar and dorsal was used to completely excise the tumour.

consistent with the fact that when GCT-TS affect the hand, it is painless, but when it affects other sites it is painful.¹⁶

Bony involvement in the form of indentation of cortices was seen in 7 cases in our series. (Fig. 1D) Surgical treatment consisted of complete surgical excision of the tumor while preserving the adjacent structures however curettage of the cortical shell in case of bony erosion should be done. The surgeon needs to take into consideration that the tumor should be completely and aggressively removed, while the normal tissue has to be preserved to enable function and recovery. (Fig. 1) GCT-TS is found in the subcutaneous plane arising from the tendon sheath, and often has extensions that go around and under several structures including the neurovascular bundle. (Fig. 1 A–B) Many a times digital nerve and vessels are snugly adhered with the tumour mass, however careful, meticulous dissection under magnification makes separation of neurovascular structure from tumour mass possible. (Fig. 1C) Repeat surgical excision in cases of recurrence become more difficult and re-emphasizes the need for meticulous, diligent and complete marginal excision of the tumour firsthand. Again incomplete excision could be the reason for the high recurrence rate.

Surgical incisions should be planned in such a way that allows the surgeon to reach the tumour extensions both dorsally and ventrally. 'Lazy-S incision' helps to clear large tumour mass involving almost two third circumference of a digit. One should not hesitate to use double incision both volar and dorsal if there is circumferential involvement of digit to completely excise the tumour mass as keyword in treatment of this tumour is complete excision. (Fig. 2C&D) The tumour itself must be dissected gently without allowing any seedling; and one should not hesitate to remove a cuff of tendon sheath; part of a capsule; periosteum or even part of a tendon; to make sure that all pathological tissue is removed.

In our series recurrence occurred in 2 cases. These two cases were large multinodular tumour and possibly incomplete excision of the tumor was the cause of recurrence as recurrent tumour developed in vicinity of primary tumour. These cases were treated by second operation and excision of recurrent mass. Kotwal et al.¹⁷ studied the role of radiotherapy in prevention of recurrence of this tumour. Out of 48 patients after operation, 14 patients, who had either mitotic figures or possible incomplete excision, were treated with local irradiation at 20 Gy in divided doses (2 Gy surface dose daily at 200 kV). No recurrences were seen in the irradiation group. Two patients in the non-irradiated group had a recurrence. They suggested a role of radiotherapy in high risk group for recurrence i.e. a) possible incomplete excision; b) the presence of mitotic figures on histological examination; or c) involvement of bone. No radiotherapy was given after primary or secondary procedure in our series. In our series 7 patients were having bony indentation however no recurrence was seen in any of them. Thorough curettage of the cortical shell should must be done in case of bony erosion to prevent recurrence.

The aim of the present study is to highlight the misdiagnosis of giant cell tumors of tendon sheath as synovial ganglion which are treated by less experienced surgeons by local injection and/or incomplete removal resulting in recurrence. These tumors are often missed due to lack of awareness. FNAC is positive in more than 90% cases and MRI gives better delineation of extent of the tumour for its complete removal. However high cost of MRI and confirmation of diagnosis on clinical and histopathological findings in almost all cases keeps MRI a reserve diagnostic tool when diagnosis is in doubt or in cases of large tumour where difficult dissection is anticipated with neurovascular structures at risk. Use of magnification loop and diligent search for the extension of tumour in surroundings tissue is a must.

5. Conclusion

Giant cell tumour of tendon sheath is a common benign condition of hand and foot and should not be missed as this seemingly benign condition if misdiagnosed and wrongly or inadequately treated may finally land in amputation of a digit. Meticulous excision of the giant cell tumour of tendon sheath in blood less field using magnification is the treatment of choice.

Conflict of interest

None.

Acknowledgment

None.

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