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Soft tissue giant cell tumor of low malignant potential

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Giant cell tumor of soft tissue (GCT-ST) is a rare tumor first described in 1972 by Salm and Sissons, followed shortly by Guccion and Enzinger. This tumor has been considered to be synonymous with the giant cell variant of malignant sarcoma with frequent local recurrence and metastasis. Recently GCT-ST has been described as a distinct entity of relatively benign prognosis, yet lacking marked atypia and pleomorphism, even in the presence of mitotic activity and vascular invasion. Now some authors think that GCT-ST represents the soft tissue analog of giant cell tumor of bone because of their histological and immunohistochemical similarity.

Some reports documented these pathological new findings, but clinical case reports with description of imagings and surgery on the basis of these knowledge are very few. The authors describe the clinical, radiological, morphologic and histopathologial features of a case of GCT-ST occurring primarily in the subcutaneous tissue of the thigh with a review of the literature.

Key words : Giant-cell tumor, Soft tissue, malignancy

INTRODUCTION

The soft tissue giant cell tumor of low malignant potential, also known as the primary giant cell tumor of soft tissue, is a rare entity and its clinical behavior is difficult to estimate. Differential diagnosis, including benign GCT of the tendon sheath and highly malignant giant cell rich sarcomas, is critical to obtain adequate surgical margins. In the field of plastic surgery, no literature reports describe recent knowledge and clinical findings of GCT-ST. Current pathological consensus is that GCT-ST is distinct from more aggressive sarcomas or the former malignant GCT [1, 2]. Metastasis and tumor-related death are exceedingly rare if GCT-ST is treated adequately by complete excision1. We report our experience with a case of GCT-ST.

CASE REPORT

A healthy 54-year-old woman presented to a local hospital with 1-month history of an asymptomatic nodule on the anteromedial aspect of her upper left thigh. The lesion was a flesh-colored, 1 cm, firm, mobile, and rapidly growing nodule with no apparent connection to the deep soft tissue. A prior history of trauma was not noted. An excisional biopsy was performed and a diagnosis of GCT of the tendon sheath with mitotic activity was rendered. The tumor was focally present at the deep and lateral pathology margins. Two months later the lesion recurred focally and grew rapidly to a 3 cm, immobile nodule with suspected connection to the underlying muscular fascia (Fig. 1). The patient presented to our hospital for further evaluation and treatment.

CT revealed a 3 × 3 cm tumor adjacent to gracilis and adductor longus in the subcutaneous fat layer of the left thigh. On T-1 weighted MRIs, most portions of the tumor showed decreased signal intensity with Gd-enhanced margins. The lesion had diffuse low-signal-intensity areas on T2-weighted images, and a markedly increased intensitiy on fat-suppression MRIs. Adjacent to fascias of adductor longus and gracilis, the tumor

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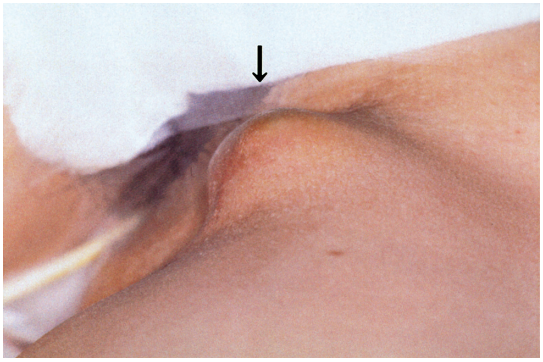


Fig. 1 Preoperative view of the recurrent tumor in the anteromedial aspect of the upper left thigh. The arrow indicates the lesion.

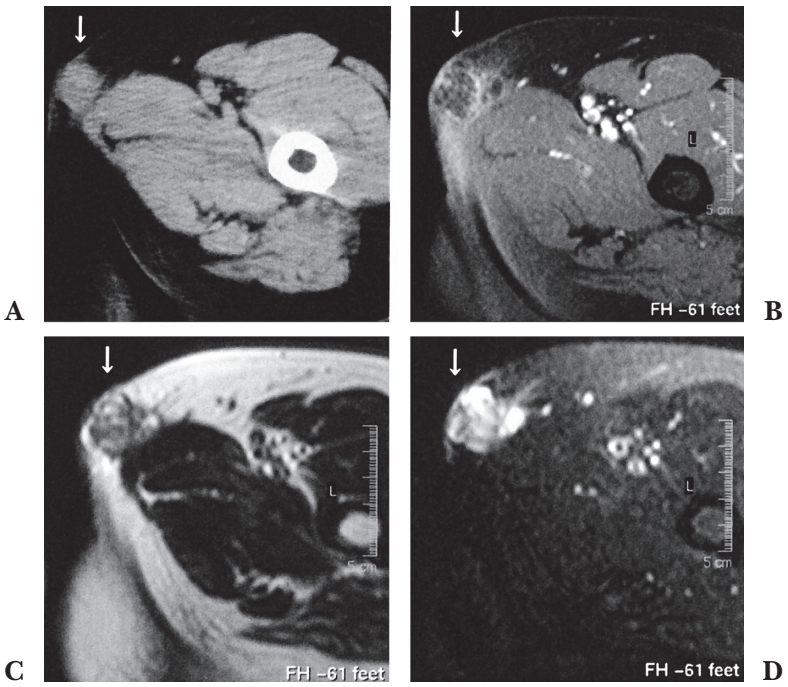


Fig. 2 Preoperative imagings. The arrow indicates the lesion.
(A) Preoperative computed tomographic scan of the patient demonstrating a soft-tissue mass adjacent to gracilis muscle.
(B) Preoperative T-1 weighted MRI with Gd-enhancement.
(C) Preoperative T2 weighted MRI.
(D) Preoperative fat-suppression MRI.

images revealed no apparent intramuscular invasion (Fig. 2). The lesion had no connection to the synovium and tendons of the left hip joint.

A wide resection of the site was performed. The tumor was totally excised with a 2 cm skin margin. Gracilis and adductor longus were removed partially with the lesion by CO2 laser (Fig. 3). A well-demarcated, 3 cm, round, and brown recurrent tumor was present in the specimen, but the surgical margins were free of tumor. No invasion of fascia and muscle was noted.

Histologic sections showed an encapsulated neoplasm composed of large nodules of cells in the subdermal fat layer which focally extended onto muscular fascia and was surrounded by compacted connective tissue.

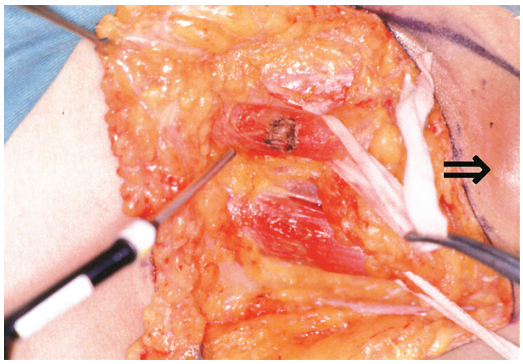
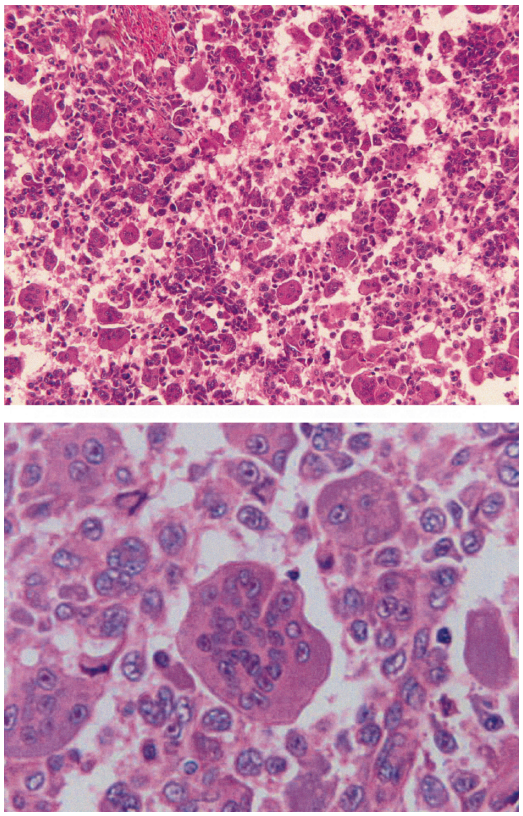


Fig. 3 Intraoperative view of the tumor excision. Gracilis and adductor longus were removed partially with the lesion by CO2 laser. The arrow indicates the lesion.



A

B

Fig. 4 (A) Photomicrograph of excised lesion demonstrating features of GCT-ST, including round to spindled cells admixed with numerous scattered osteoclast-like giant cells. H & E, original magnification × 200.
(B) Note the absence of prominent pleomorphism and significant cytologic atypia even in the face of mitotic activity. H & E, original magnification × 1000.

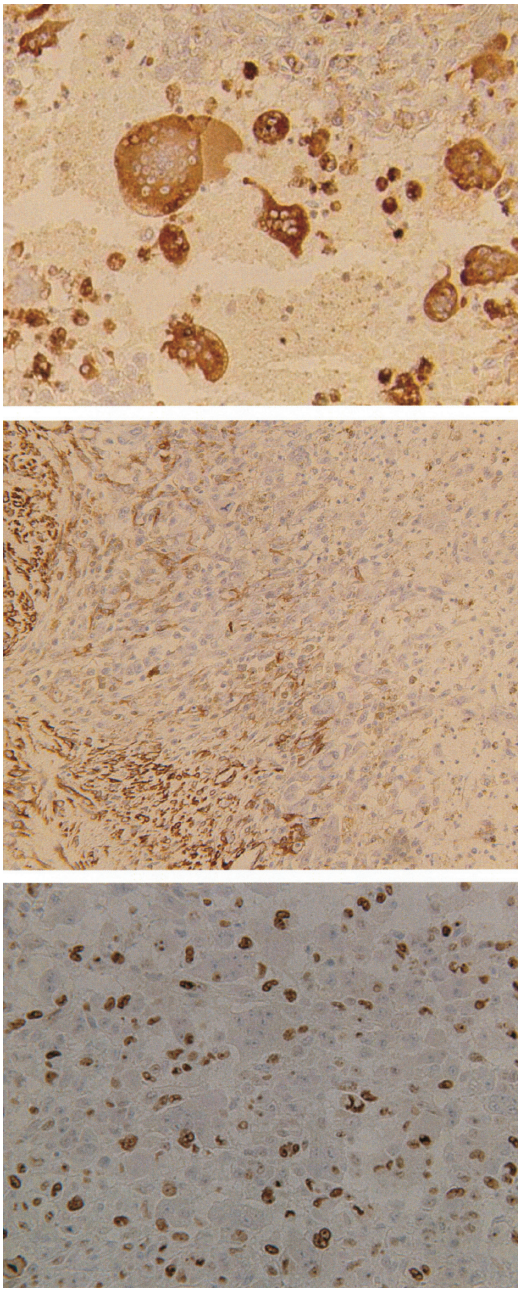


Fig. 5 Positive CD68 (above, original × 400) and SMA (center, × 200) stain. Note the mononuclear giant cells and foci in the mononuclear cells. MIB stain showed high mitotic rate of over 20/10 HPF (below, × 200).

The neoplastic cells were round to spindled with vesicular nuclei that resembled the nuclei of the numerous scattered osteoclast-like giant cells (Fig. 4A). Prominent pleomorphism and significant cytologic atypia were absent. The mitotic rate was over 20/10 HPF, but no atypical mitoses were noted (Fig. 4B). Angiolymphatic invasion was not identified. Immunohistochemically, the specimen exhibited positive CD68 and smooth muscle actin and lack of CD45, desmin and S-100 protein (Fig. 5). The histologic features were compatible with the diagnosis of GCT-ST of low malignant potential.

The postoperative course was uneventful and periodic CT and MRI showed no recurrence. The patient is well, without evidence of disease, one year post surgery.

DISCUSSION

Differential diagnosis

GCT-ST was grouped with other lesions in the past, such as tenosynovial GCT, malignant GCT, and other giant cell rich sarcomas [3, 4]. A differential diagnosis of these tumors is mandatory to plan treatment because their behavior and prognosis differ1. Recently GCT-ST has been described as a distinct entity of relatively benign prognosis, yet lacking marked atypia and pleomorphism, even in the face of mitotic activity and vascular invasion. Now some think that GCT-ST represents the soft tissue analog of GCT of bone (GCT-B) because of histological and immunohistochemical similarity [1, 2, 5-8]. Recently immunohistochemical findings have been reported to be significant differencial markers for these tumors [1, 2, 6, 8].

GCT of the tendon sheath

GCT-ST is frequently confused with tenosynovial GCT. GCT of the tendon sheath is the second most common tumor of the hand, but GCT-ST rarely arises on the hand [9-11]. GCT of the tendon sheath show prominent stromal hyalization and heterogeneous cells including xanthoma cells, siderophages, and lymphocytes. Different from GCT-ST, they show no frequent nuclear mitosis or vascular invasion [5]. GCT of the tendon sheath shows positive CD48 and desmin, and negative SMA.

GCT of bone

GCT-ST is considered to be identical to GCT-B and clinical behaviors of these tumors are similar [2, 5, 7, 12]. Positive CD68 and smooth muscle actin (SMA), and negative CD45, desmin and S-100 protein are frequently observed in both GCT-ST and GCT-B (Fig. 5). GCT-B with mitotic activity and vascular invasion does not necessarily give rise to metastatic disease [6]. Survival rates of GCT-B with metasitasis are high. Only three of the 31 patients with metastasizing GCT reviewed by Maloney *et al.* died of metastatic disease [13].

"Malignant GCT of soft tissue"

The entity called "malignant giant cell tumor of soft tissue" is histologically a mixture of variety of giant cell rich tumors like giant cell rich pleomorphic sarcoma (malignant fibrous hystiocytoma), extraskeletal osteosarcoma, epithelioid sarcoma, and leiomyosarcoma [1, 12, 14, 15-17]. They present marked atypia and pleomorphism with mitotic activity and vascular invasion. CD68 and SMA staining is not common in malignant GCT. Very poor five-year survival rate of these tumors are nearly 50 % and clearly different from those of GCT-ST.

Soft tisuue GCT of low malignacy

GCT-ST is rare tumor with borderline malignancy. First described in 1972 with more malignant groups, 56 cases of GCT-ST had been reported by 2002 [1-4, 6-8]. Patients ranged in age from the high teens to 80 years of age, with a slight dominance in men. The tumors are between 0.5 cm and 10 cm (mainly 1.5-3 cm), firm, nontender, fast-growing masses developed in the skin or subcutis, with half of them present in deep soft tissue. GCT-ST shows nuclear mitosis and vascular invasion but their atypia is mild to moderate. Pleomorphic giant cells are absent.

Treatment and Prognosis

Complete removal of the GCT-ST with negative surgical margins assures no recurrence but lung metastases were reported in cases with positive surgical margins. The incidence of local recurrence is high. The recurrence rate is 28 % in skin and 45 % in deep soft tissue [7]. All recurrent cases were positive in the surgical margins. Four cases of distant metastasis, all in the lungs, were reported and three of them were diagnosed at first visit [7]. A tumor-related death is only one case [7], an 80-year-old female with a 10 cm tumor in her

thigh, who died of respiratory failure due to lung metastasis 12 months after marginal excision followed by postoperative radiotherapy. She had local recurrence at 2 months and lung metastasis at 9 months after initial treatment.

With no solid evidence available, radiation can be considered when the proximity of critical structures prevents clear surgical margins. Further study of chemotherapy is warranted.

CONCLUSION

Despite of current pathological advancement regarding this entity, clinical case reports with description of imagings and surgery on the basis of these knowledge are very few. We presented the clinical, radiological, morphologic and histopathologial features of a case of GCT-ST and described the surgical treatment.

GCT-ST is a low-malignant tumor similar to giant cell tumor of bone and should be distinguished from more aggressive sarcomas or the former malignant GCT. On the basis of the diagnosis, we treated the patient by complete wide excision and pathology showed the negative surgical margin. The current knowledge assures the patient is expected to have a benign prognosis.

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