

건초거대세포종의 압착도말 및 세포흡인 세포소견

- 1예 보고 -

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Touch Imprint and Fine Needle Aspiration Cytology of Giant Cell Tumor of Tendon Sheath - A Case Report -

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Giant cell tumor of the tendon sheath (GCTTS) is a slowly growing, benign soft tissue tumor. The tumors occur predominantly on the hands and feet. Although the clinical and histopathologic features are well-defined, only a few reports have described the cytologic appearance of this entity. A 26-year-old woman presented with a gradually developing circumscribed soft tissue mass near the proximal phalanx of her left little finger for one year. Imprint and fine needle aspiration (FNA) smears were obtained from the excisional biopsy specimen. The imprint smears were composed of predominantly singly dispersed bland mononuclear cells and several giant cells. The mononuclear cells were polygonal to round, and they showed a histiocyte-like appearance. Osteoclast-type multinucleated giant cells of various sizes were randomly scattered throughout the smears, and these cells contained 3 to 50 nuclei. Nuclear atypia and pleomorphism were absent in both the single and giant cells. Loose aggregates of hemosiderin-laden macrophages and binuclear stromal cells were also seen. The cytologic features of the FNA smears were similar with those of the imprint. Additionally, the FNA smears contained several clumps of densely collagenous stromal tissue that were seldom noted in previously reported cytologic material. The cytologic features were well-correlated with the concurrent histologic findings and the diagnosis of GCTTS was made. When the clinical and radiologic datas are integrated, the diagnosis of GCTTS can be strongly suggested, based on the pre-operative cytologic specimen.

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Key Words : Giant-cell tumor, Tendon sheath, Cytology, Imprint,
Fine needle aspiration

INTRODUCTION

Giant cell tumors of the tendon sheath (GCTTS) are the second most common lesion of the hand, with simple ganglion cysts being the most common. This tumor

was first described by Chassaignac, who referred to it as a "cancer of the tendon sheath".¹ However, subsequent studies have delineated the clinical features and natural history, and GCTTS has been established as a benign soft tissue tumor. GCTTS frequently occurs in

hands, feet, ankle and knee as a well-demarcated lobulated soft tissue mass.² The preferred anatomical location and the characteristic magnetic resonance imaging (MRI) appearance usually help to make a preoperative diagnosis, but an unusual location can cause confusion with other tumors or tumor-like lesions. Preoperative cytologic evaluation can give valuable clues for the early diagnosis of the soft tissue tumors and to exclude clinically similar lesions. To date, only a few reports have addressed the cytologic appearance of GCTTS in the fine needle aspiration smears (FNA), which show heterogenous population of cells such as mononuclear stromal cells, giant cells and siderophages.³⁻⁷ The purpose of this study is to report on the more comprehensive cytomorphologic features of GCTTS with using both imprint and FNA smears, along with making the cytologic differential diagnosis.

CASE

Clinical Presentation

A 26-year-old woman presented with a soft tissue mass around the little finger of the left hand and intermittent pain for one year. The mass had recently been increasing in size. There was no history of trauma or significant past medical history. On physical examination, there was no discoloration of the overlying skin. The soft tissue mass was located near the proximal phalanx of the little finger, and the mass measured 2×1 cm. It was firm, slightly mobile and nontender on palpation. There was no effusion in the joint space. The MRI scan showed a well-circumscribed, extraarticular soft tissue mass with no bony destruction and it suggested giant cell tumor of the tendon sheath (Fig. 1). Excisional biopsy was performed. The specimen was a well-demarcated tan nodule with a lobulated contour, and it measured $2.7 \times 2 \times 0.5$ cm. Scanty thick yellowish material was noted on the external surface. The cut surface was gray white and solid with focal yellow



Fig. 1. MRI scan of left hand. The enhanced coronal T1-weighted image shows a well-defined soft tissue mass around the proximal phalanx of little finger. There is no bony erosion or destruction.

flecks at the periphery. Fine needle aspiration was performed on the surgical specimen with using a 10 ml disposable syringe attached to a 22 gauge needle. A number of smears were made. Additionally, touch imprint smears were prepared. All the smears were fixed in 95% alcohol overnight and stained with hematoxylin and eosin, and Papanicolaou stain. The surgical specimen was fixed in 10% neutral buffered formalin and embedded in paraffin. Four micrometer-thick sections were stained with hematoxylin and eosin.

Cytologic Findings

The touch imprint smears were moderately cellular. On low power, the most of aspirates presented as individually dispersed mononuclear cells along with several multinucleated giant cells (Fig. 2A). Only one loose cellular aggregate was seen and any tightly packed three-dimensional tissue fragments were absent. The majority of singly dispersed cells were round to polygonal histiocyte-like mononuclear cells that showed eccentrically located round or reniform nuclei with longitudinal grooves and convolutions. The nuclear chromatin was finely granular and evenly hypochromic, and the nucleoli were small and inconspicuous (Fig. 2B). There was

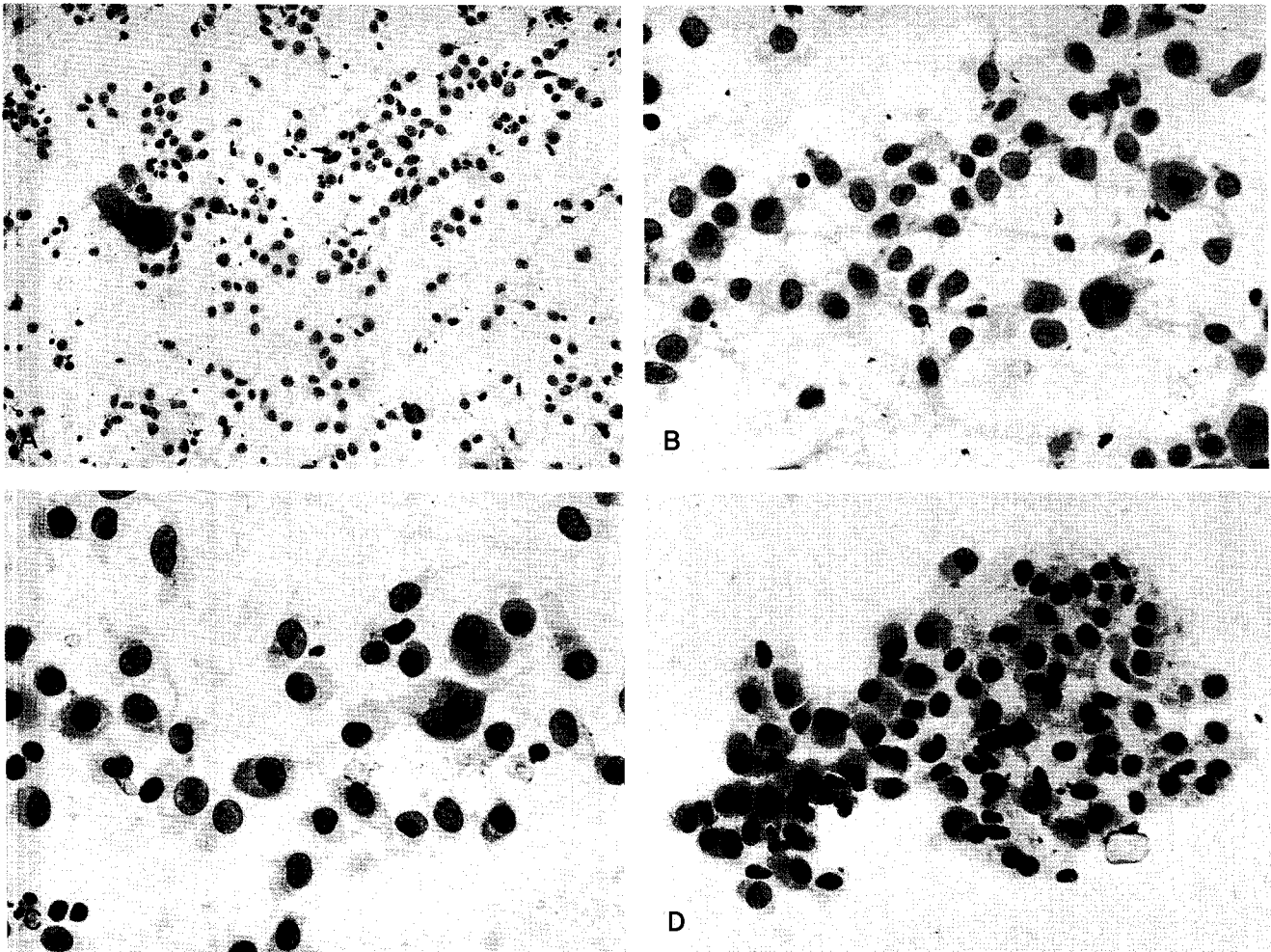


Fig. 2. Cytological features on touch imprint smears. (A) On low power, the aspirates presented as individually dispersed mononuclear cells along with a multinucleated giant cell. (B) The majority of singly dispersed cells were round to polygonal histiocyte-like mononuclear cells. A small multinucleated giant cell reveals similar cytological features with mononuclear cells. (C) Occasionally, several large or polygonal mononuclear or binuclear stromal cells with perceptible single nucleoli are noted. (D) An aggregate of hemosiderin-laden macrophages is easily seen. (A&B: Papanicolaou stain, C&D: H&E).

a moderate amount of cytoplasm and the cellular border was ill-defined. Large mononuclear or binuclear stromal cells were occasionally seen and they showed round nuclei with single apparent nucleoli and abundant cytoplasm (Fig. 2C), but the cellular atypia was minimal. Mitotic figures were not infrequent. The additional mononuclear cells were macrophages with round nuclei; they had more abundant cytoplasm and they occasionally showed phagocytotic activity. Some of them contained coarse, refractile, granular and brown pigments, indicating they were siderophages (Fig. 2D). Several spindle cells with thin elongated nuclei and a few vacuolated cells were also noted. Any xanthoma-

tous cells were absent. Osteoclast-type multinucleated giant cells were randomly scattered throughout the smears (2A, 2B). The giant cells varied widely in size and the number of nuclei as varied (range: 3 to 50 nuclei). Most of the giant cells were small with less than 20 nuclei. The nuclear features of the giant cells were similar to those of the surrounding mononuclear cells, showing a finely granular chromatic pattern. The nuclear grooves and convolutions were less common in the giant cells than in the mononuclear cells. The backgrounds of the imprint smears were relatively clean with no necrosis or hemorrhage. Overall, the cellular composition and their cytologic features on the FNA

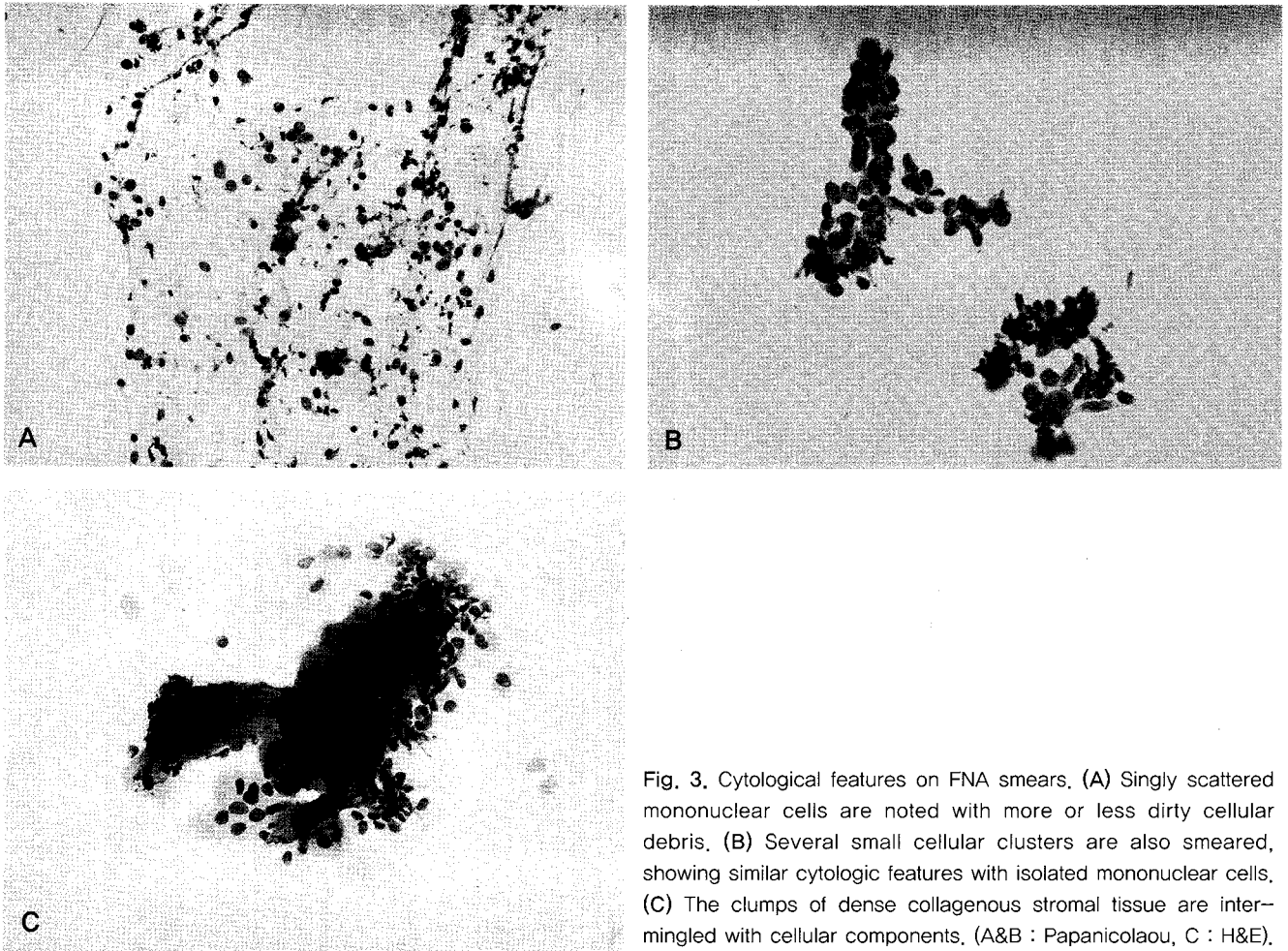


Fig. 3. Cytological features on FNA smears. (A) Singly scattered mononuclear cells are noted with more or less dirty cellular debris. (B) Several small cellular clusters are also smeared, showing similar cytologic features with isolated mononuclear cells. (C) The clumps of dense collagenous stromal tissue are intermingled with cellular components. (A&B : Papanicolaou, C : H&E).

smears were similar to those of the imprint smears. The FNA smears were more cellular. The low power view revealed several small cellular clusters and tissue fragments as well as numerous singly scattered mononuclear cells (Fig. 3A, B). The FNA smears also contained several fragments of hyalinized dense collagenous stromal tissue (Fig. 3C). At the high magnification, the cells in the cellular clusters and in the tissue fragments were same as the singly dispersed cells. A portion of the tissue fragments was distorted by squeezing artifact. The background was more or less dirty due to cellular debris, but it was not truly necrotic.

Histologic Findings

The tumor was focally encapsulated by a fibrous capsule. The lesion showed a polymorphic cellular

population that included mononuclear stromal cells, giant cells, hemosiderin-laden macrophages and xanthoma cells. Mononuclear stromal cells usually formed large sheets and occasionally loose aggregates (Fig. 4A). The individual stromal cells contained round to indented nuclei with nuclear grooves and convolutions (Fig. 4B) and they were morphologically well correlated with the mononuclear cells seen on the cytology. Mitoses were identified in the stromal cells up to three per 30 HPF. The giant cells were of the osteoclastic type and they were randomly scattered throughout the lesion. Most of the giant cells were small, containing less than 20 nuclei. A significant portion of the lesion revealed various degrees of hyalinization. Thick densely collagenous bands invested the loose cellular aggregates (Fig. 4B). Xanthoma cells were densely collected in one focus near the periphery of the lesion (Fig. 4C).

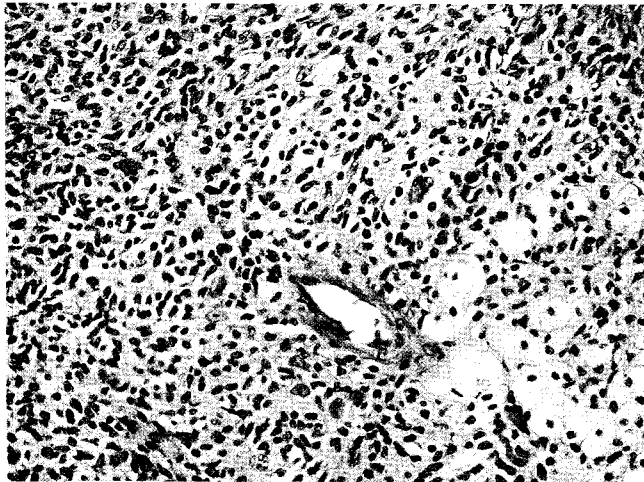
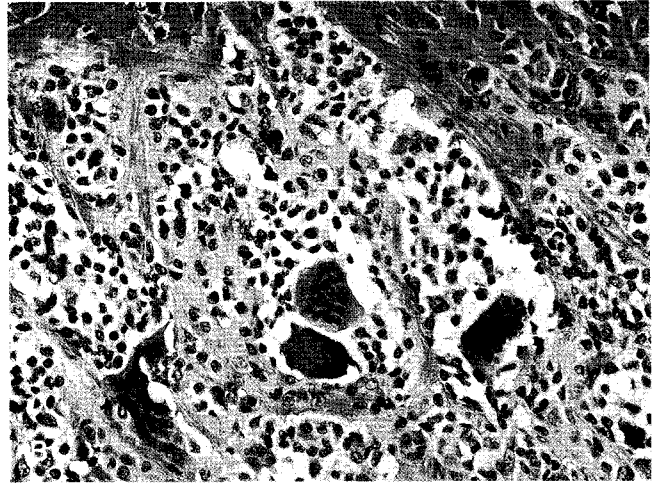
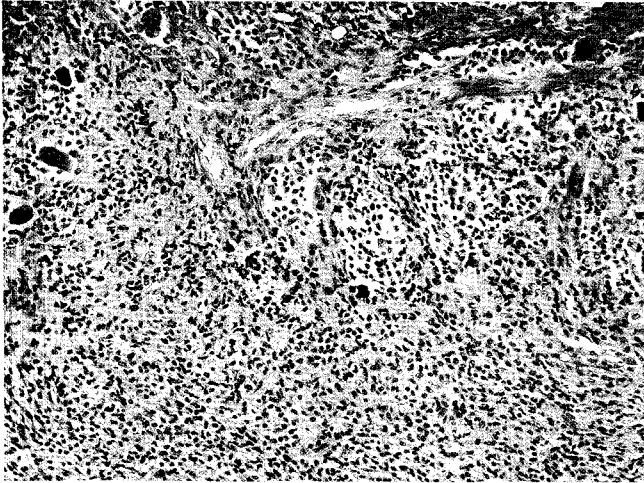


Fig. 4. Histologic findings. (A) Histologic section reveals large sheets and loose aggregates of mononuclear stromal cells with several giants cells. (B) Dense collagenous bands invest loose aggregates of mononuclear cells resembling bland histiocytes. Several osteoclast-type multinucleated giant cells are seen. (C) Focally, foamy xantomatous cells are aggregated. (H&E)

Hemosiderin-laden macrophages and stromal cells were easily identified throughout the specimen. Apoptotic bodies or necrosis were absent. The diagnosis of GCTTS was confirmed by histologic examination.

DISCUSSION

Tenosynovial giant cell tumor (TGCT) is the most common, prototypic tumor of the tendon sheath and synovium. These tumors are divided into the diffuse and localized types, depending on their growth pattern.² The diffuse type of TGCT (D-TGCT) is a soft tissue counterpart of pigmented villonodular synovitis of the joint space. It usually represents the extraarticular extension of a primary intraarticular process, but rarely is it located completely outside of the joint as a pure,

extraarticular mass. D-TGCT occurs in young people, and it dominantly affects the knee, ankle, foot and wrist joints with an infiltrative growth pattern. D-TGCTs are best regarded as benign, but locally aggressive neoplasms with a significant potential for recurrence and they should be treated by wide excision. In contrast, the localized type of TGCT,^{2,8} better known as giant cell tumor of the tendon sheath (GCTTS), occurs predominantly on the hand and it is most commonly seen in people who are between 30 and 50 years old, with a 2:1 female predominance. GCTTS is typically presented as a solitary, painless soft tissue mass that grows slowly over a long time. Grossly, GCTTSs are usually small, well-circumscribed lobulated masses that are partially invested by a dense collagenous capsule. Most GCTTS are composed of sheets of round to polygonal mononuclear cells, multinuclear giant cells, xanthoma

cells, siderophages and hyalinized stroma. The pathogenesis and basic nature of these lesions is debatable.⁸ An antecedent history of trauma and hemorrhage favor the reactive theory, but there are aneuploidy and clonal chromosomal abnormalities in some case, and the capacity of autonomous growth by this lesion strongly supports a neoplastic origin.

Preoperative cytologic examination is currently accepted as a firm, reliable method for diagnosing various epithelial neoplasms, but most practicing pathologists are inexperienced with the wide array of soft-tissue neoplasms. Because soft tissue masses in the head and neck, extremities, and the trunk are easily assessable, they have emerged as important new targets for FNAC, and so pathologists should be familiar to their cytologic features. Furthermore, this cytologic knowledge is important for making a diagnosis of the lesions in unexpected sites. To date, a few reports have described the cytologic features of GCTTS in FNA smears.³⁻⁷ In the present study, the detail cytologic features of the GCTTS were evaluated in both the touch imprints and the FNA smears.

The touch imprint smears revealed well-preserved cytologic details on a relatively clean background. Most of the cellular population presented as singly dispersed mononuclear cells rather than cohesive clusters. The predominant cells were bland histiocyte-like cells that showed round to oval nuclei or frequently eccentrically located reniform nuclei with grooves, fine nuclear chromatin, a single small indistinct nucleoli and a moderate amount of cytoplasm. Osteoclast-type multinucleated giant cells, hemosiderin-laden macrophages, spindle cells and a few vacuolated cells were also seen. The FNA smears were more cellular than the imprint smears and they contained more small cellular clusters in addition to the predominantly singly scattered mononuclear cells. The above mentioned cytologic features were similar to those of the previous reports.³⁻⁷ In addition, our case's FNA smears disclosed several clumps of acellular, dense collagenous stromal tissue as one of the important histologic features, but this has seldom been

reported in the previous cytology reports.⁶ The present cytologic examination did not show xanthoma cells. This may be due to sampling error because the xanthoma cells were densely collected in focal areas on the tissue sections, the same as was seen in the previous reports.^{3,7} Cellular debris was found at the periphery of the small cellular clusters and in the background of the FNA smears, causing a more or less dirty appearance. Previously, Iyer VK et al.⁶ briefly mentioned the presence of focal nuclear debris in the FNA smears of GCTTS, and Monaghan H et al.⁹ documented apoptotic bodies in the areas with numerous giant cells on the histologic sections. However, apoptotic bodies have not been consistently described on the histologic sections of the previous reports^{2,8} and true cell necrosis was absent in the previous cytology literature.^{3, 5-7} Cellular debris, apoptotic bodies or necrosis were absent in the imprint smears and the histologic sections of the present case. So, cellular debris and the somewhat distorted cellular architecture in the FNA smears may have been caused by artificial mechanical damage. The cytologic features of the imprint and FNA smears in the present case overlapped and they complemented each other, and the concurrent histologic features were well reflected in the cytologic materials. Although the cytologic diagnosis of GCTTS is possible based on the close clinicopathological correlation, several tumor entities should be considered before making a diagnosis. The cytologic differential diagnosis in this case includes D-TGCT, giant cell tumor of soft tissue (GCT-ST), monophasic synovial sarcoma (SS) and giant-cell malignant fibrous histiocytoma (MFH).

GCTTS should be differentiated from D-TGCT, and especially from the purely extra-articular form, because the two lesions differ for their biological behavior.² In contrast to GCTTS, the cytologic aspirates of D-TGCT are fairly cellular and the mononuclear cells are arrayed both in three dimensional cohesive aggregates and as isolated cells.^{10,11} The presence of more frequent three dimensional cellular clusters may suggest the higher growth potential of D-TGCT compared to that of

GCTTS. Occasionally, the polygonal and round mononuclear cells exhibit a marked tendency of toward xanthomization.¹⁰ Multinucleated osteoclast-type giant cells are less frequent in GCTTS.¹¹ The anatomic location and growth pattern of the lesion may help make the distinction between GCTTS and D-TGCT because the histologic and cytologic appearance of the two lesions are more and less similar and overlapped.

Giant cell tumor of soft tissue (GCT-ST) is a recently recognized rare, but distinct entity that occurs primarily in superficial soft tissue. GCT-ST is regarded as a soft tissue counterpart of giant cell tumor of bone in term of the growth pattern, the histologic features and the biologic behavior.⁸ The FNA from GCT-ST are highly cellular with two cell populations composed of round to oval, mononuclear stromal cells and a striking multinucleated giant cell population.^{12,13} Numerous bland looking osteoclast-type multinucleated giant cells were evenly distributed, and they showed isomorphic nuclei with oval to round contours and small single nucleoli.¹³ Some of the mononuclear cells and non-osteoclast multinucleated cells displayed slight to moderate cytologic atypia, such as hyperchromatic enlarged nuclei and anisocytosis.

Synovial sarcoma (SS) frequently arises adjacent to joints or tendon sheaths. Especially, monophasic SS contains rather bland oval or short fusiform nuclei with inconspicuous nucleoli that are similar to the mononuclear stromal cells of GCTTS. However, monophasic SS contains predominant spindle cells that are arranged in tight cohesive clusters. Other characteristic findings of GCTTS, including multinucleated osteoclast-type giant cells, siderophages and xanthoma cells, are absent in synovial sarcoma.¹⁴

Giant-cell MFH contains numerous osteoclast-like giant cells with bland nuclei. However, the dominant mononuclear cells and pleomorphic giant cells exhibit striking pleomorphism, anisocytosis and nuclear anaplasia with frequent mitoses in a dirty background.

In summary, the present article evaluated the cyto-

morphic features of a case of GCTTS with using both imprint and FNA smears, and we compared these with the corresponding histologic features. When interpreted along with the clinical features, the diagnosis of GCTTS can be suggested based on the cytologic specimen.

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