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폐리연부육종의 세침흡인 세포소견
-1예 보고-

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= **Abstract** =

Fine Needle Aspiration Cytology of Alveolar Soft Part Sarcoma
-A Case Report-

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Alveolar soft part sarcoma (ASPS) is a rare soft tissue sarcoma, which occurs predominantly in adolescents and young adults. The cytological characteristics of this condition have been described only rarely in the literature. Here, we report a case of alveolar soft part sarcoma. A 28-year-old man presented with a mass in his right buttock, which had persisted for three years. The mass was subjected to a fine needle aspiration cytology (FNAC). The smears were cellular. The observed tumor cells were round or polygonal, and exhibited vesicular nuclei with prominent nucleoli and finely granular cytoplasm. Naked nuclei were frequently detected. Tumor cells were arranged singularly, but occasionally in a pseudoalveolar pattern.

Key words: Alveolar soft part sarcoma, Fine needle aspiration cytology, Soft tissue

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INTRODUCTION

Alveolar soft part sarcoma (ASPS) is a rare soft tissue sarcoma, and was initially described in 1952 by Christopherson *et al.*[1] ASPS accounts for 0.5 to 0.9% of all soft tissue sarcomas.[2] The majority of patients are adolescents and young adults, between 15 and 35 years of age.[3] ASPS tends to occur in the thigh and buttock in adults, and the head and neck in children. It is characterized by an indolent but fatal course, and metastases tend to occur early within the course of the disease. The histogenesis of ASPS remains a matter of some controversy. Histologically, ASPS involves large, uniform, epithelioid cells, with abundant eosinophilic granular cytoplasm arranged in solid nests and/or alveolar structures, separated by thin sinusoidal vessels.[2] Fine needle aspiration cytology (FNAC) findings have been described in a few previous reports.[4-8] Here, we describe the cytological characteristics of APSP observed in the right buttock of a 28-year-old man.

CASE

A 28-year-old man presented with a mass in his right buttock, which had persisted for three years. This mass had also apparently been gradually growing larger. The patient denied any pain associated with the mass. Past medical history was noncontributory. The physical examination revealed a movable mass in the patient's right buttock. Upon magnetic resonance (MR) imaging, the mass was found to be located within the gluteus muscle. The mass appeared slightly hyperintense on the T1-weighted image and heterogeneously hyperintense on the T2-weighted image (Fig. 1). Post-contrast imaging showed enhancement in the mass. Ultrasonography revealed a hypervascular tumor mass. Chest computed tomography (CT) evidenced metastatic nodules occurring in the right lower lung. A fine needle aspiration biopsy was conducted. The cytological interpretation was malignant tumor, suggestive of alveolar soft part sarcoma. The right buttock mass was excised widely. The diagnosis of alveolar soft part sarcoma was histologically proven. The patient was then administered six courses of postoperative chemotherapy with cyclophosphamide, vincristine, adriamycin, and dacarbazine. During the follow-up period, new metastatic nodules were detected within the bilateral lungs. The patient remained alive at 32 months after surgery.

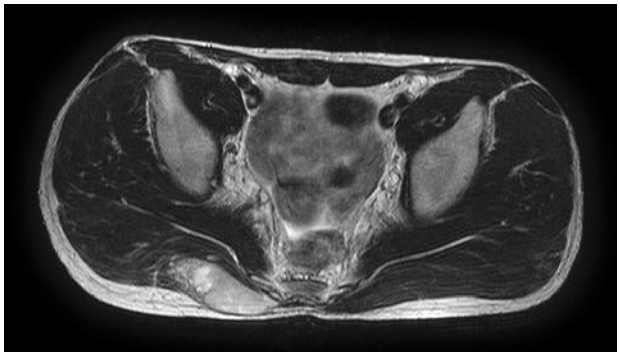

Fig. 1. Magnetic resonance imaging. Axial T2-weighted image shows heterogeneously high signal intensity in the right buttock mass.

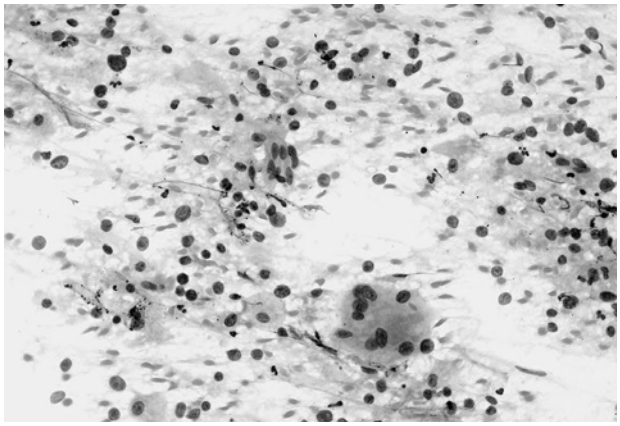

Fig. 2. Cytologic finding. Tumor cells are seen singularly or clusters in bloody background. (Papanicolaou)

Cytologic Findings

The smears were stained via hematoxylin-eosin and Papanicolaou staining. The smears were cellular. Tumor cells were arranged either singly, or in clusters (Fig. 2). The background was bloody. The observed tumor cells were round or polygonal, with moderate quantities of finely granular cytoplasm (Fig. 3). Eccentrically located nuclei were observed. Tumor cells exhibited round, vesicular nuclei, with prominent nucleoli. Naked nuclei

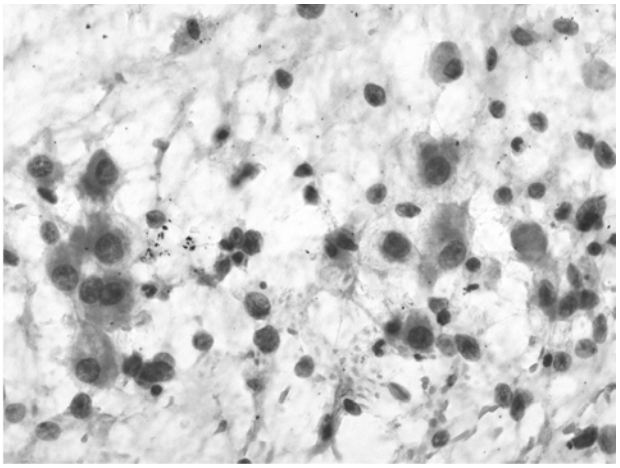

Fig. 3. Cytologic finding. Tumor cells are round to polygonal-shaped, with moderate amounts of finely granular cytoplasm. (Papanicolaou)

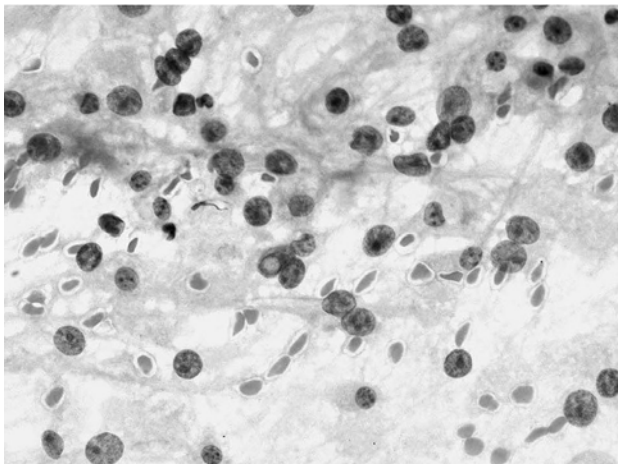

Fig. 4. Cytologic finding. Tumor cells have round, vesicular nuclei with prominent nucleoli. Intranuclear inclusion is present. (Papanicolaou)

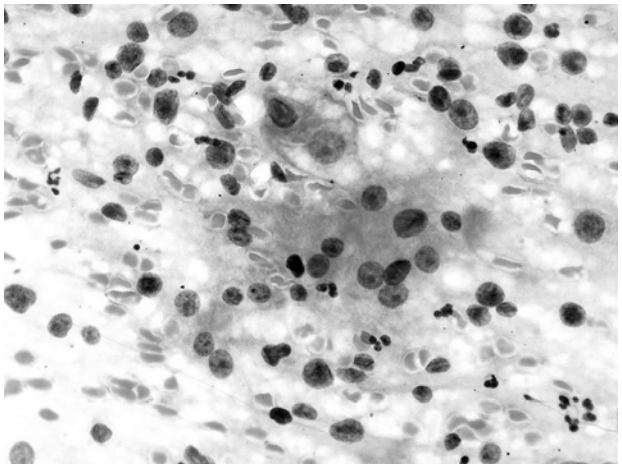

Fig. 5. Cytologic finding. Tumor cells are arranged in pseudoalveolar pattern. (Papanicolaou)

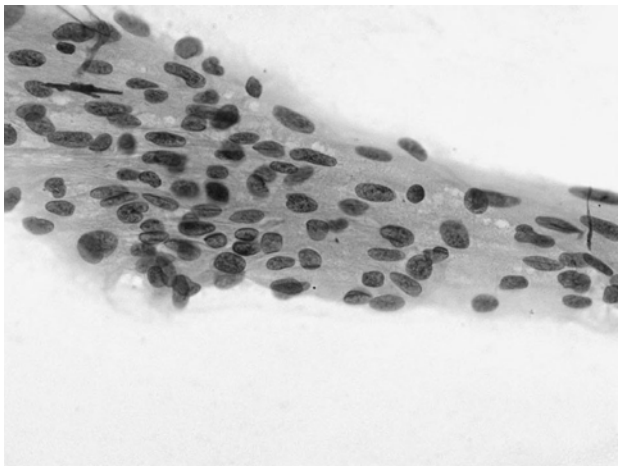

Fig. 6. Cytologic finding. Some tumor cells are spindle or oval-shaped. (Papanicolaou)

were also frequently observed. Intranuclear inclusions were rarely detected (Fig. 4). The chromatin was finely granular. Binucleated cells were seen on occasion. Mild cellular pleomorphism was detected. Some of the tumor cells were arranged in a pseudoalveolar pattern (Fig. 5). Spindle or oval-shaped tumor cells were also occasionally detected (Fig. 6). Mitotic figures were rare. No intracytoplasmic crystals were detected.

Gross and Histological Findings

The excised specimen consisted of a soft tissue mass with attached skeletal muscle, measuring 7.5 × 6.5 × 4.0 cm. On section, a well-demarcated, yellowish-brown, rubbery soft tumor mass was observed, which measured 4.5 × 3.0 × 3.0 cm (Fig. 7). Focal cystic change was present. Histologically, the tumor cells were large and epithelioid, possessing vesicular nuclei with prominent nucleoli and abundant, eosinophilic granular cytoplasm. The tumor cells were arranged in a pseudoalveolar and solid nest pattern, separated by thin fibrovascular septa (Fig. 8). Vascular invasion was also detected. Periodic acid-Schiff (PAS)-positive, diastase-resistant intracytoplasmic crystals were observed. Upon immunohistochemical staining, the tumor cells proved to be positive for desmin and negative for S-100 protein, chromogranin,

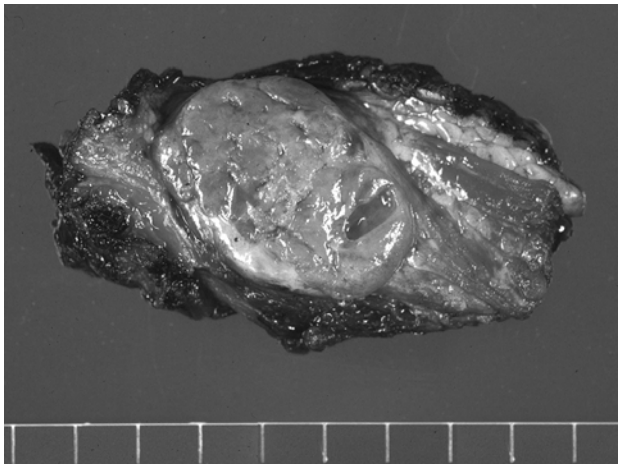

Fig. 7. Gross finding. Tumor is well demarcated, yellowish brown with focal cystic change.

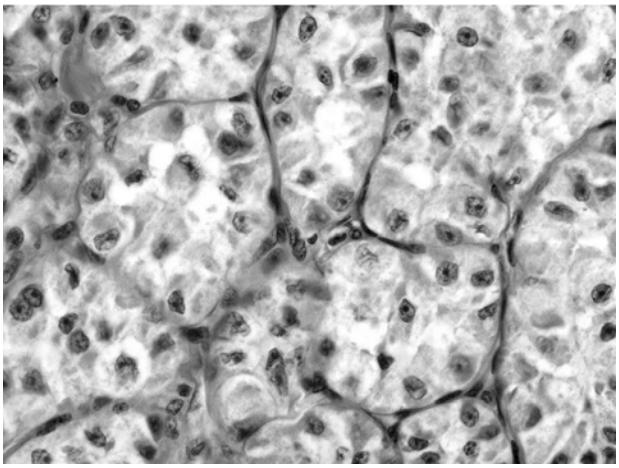

Fig. 8. Histologic finding. Tumor cells are arranged in pseudoalveolar and solid nest pattern.

smooth muscle actin, and cytokeratin (AE1/AE3). Upon electron microscopic examination, the tumor cells evidenced membrane-bound, rhomboid, and rectangular intracytoplasmic crystals (Fig. 9).

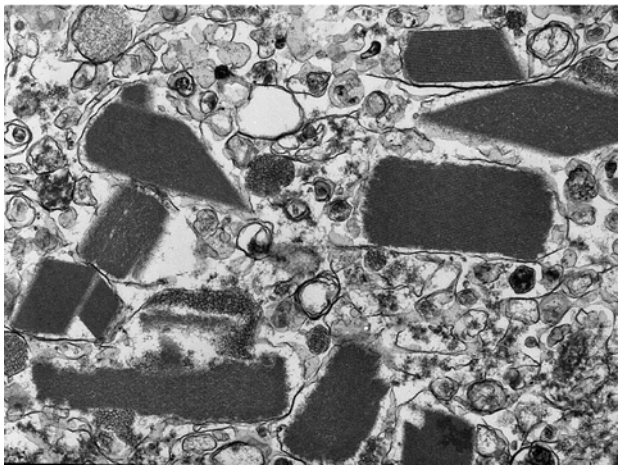

Fig. 9. Electron microscopic finding. Tumor cells show membrane-bound, rectangular and rhomboid-shaped crystals (uranyl acetate and lead citrate, x20,000).

DISCUSSION

ASPS is a rare soft tissue sarcoma, which primarily affects adolescents and young adults. It classically presents as a gradually growing, painless mass. The cytological characteristics of ASPS have been previously described.[4-8] The tumor cells are large, epithelioid, and polygonal, and exhibit round to oval, slightly eccentric nuclei, also evidencing conspicuous nucleoli and finely granular cytoplasm. The tumor cells are arranged in either a single or pseudoalveolar pattern. The cytological features observed in the case described in this report were generally consistent with the findings of previous cases. In this case, naked nuclei were frequently detected. This is likely attributable to the fragility of the cell cytoplasm, coupled with the mechanical forces inherent to the smearing procedure.[9] The aspiration smears were bloody as the result of the vascular nature of the tumor. The finding of a typical organoid arrangement of tumor cells on smears is a fairly rare event, in contrast to the easy recognizability of such arrangements in tissue. The bloody background and the absence of pseudoalveolar and solid nest patterns may contribute substantially to the difficulty associated with the diagnosis of ASPS.

The detection of characteristic intracytoplasmic crystals in Papanicolaou-stained FNAB smears facilitates the proper evaluation and correct diagnosis of ASPS.[10] However, the confirmation of these crystals is usually not possible simply by Papanicolaou staining. In the present case, we were unable to identify intracytoplasmic crystals. Giemsa or PAS staining using air-dried material tends to facilitate a confirmation of crystals more readily than does Papanicolaou staining.[11] Riu's staining can also reveal the needle-+shaped crystals associated with ASPS, which can not be revealed by Diff-Quik or Papanicolaou stain.[12]

The present case revealed the characteristic histological features of alveolar soft part sarcoma, intracytoplasmic crystals on PAS stain after diastase digestion, and ultrastructurally membrane-bound, rhomboid and rectangular crystals.

The histogenesis of ASPS has yet to be thoroughly elucidated. Myogenic differentiation is the currently favored hypothesis, however, on the basis of the immunohistochemical demonstration of muscle markers, including desmin and MyoD1.[13,14] The immunoreactivity for desmin evidenced in the current case appears to be indicative of skeletal muscle differentiation.

The differential diagnosis of alveolar soft part sarcoma includes paraganglioma, granular cell tumor, alveolar rhabdomyosarcoma, clear cell sarcoma, epithelioid sarcoma, other epithelial-like sarcomas, and metastatic non-small cell carcinoma. The detection of a pseudoalveolar pattern raises concerns of paraganglioma. However, the larger, vesicular nuclei and prominent nucleoli would be somewhat unusual for paraganglioma. Paraganglioma does not occur in the extremities. Granular cell tumors are comprised of cells containing more densely eosinophilic cytoplasm, and these cells were S-100 protein-positive. The prominent nucleolus and larger size of the cells can be considered to exclude granular cell tumor. The tumor cells associated with alveolar rhabdomyosarcoma are smaller and more pleomorphic than those of ASPS. The nuclei of rhabdomyosarcoma cells are dense, but are vesicular in cases of alveolar soft part sarcoma. Prominent nucleoli do not constitute a characteristic feature of alveolar rhabdomyosarcoma. ASPS typically involves larger cells with more voluminous cytoplasm and less vacuolization than does clear cell sarcoma. Immunophenotypically epithelioid sarcoma tests positive for cytokeratin, epithelial membrane antigen, vimentin, and CD34. Cytoplasmic fragility can be helpful in the differentiation of ASPS from other epithelial-like sarcomas, such as epithelioid malignant peripheral nerve sheath tumor, epithelioid angiosarcoma, epithelioid leiomyosarcoma and malignant rhabdoid tumors.[6] In cases of metastatic non-small cell carcinoma, the majority of cells smear in cohesive aggregates. Immunohistochemical staining can then prove helpful, as metastatic carcinoma cells tend to test strongly positive for cytokeratin.

The prognosis of this condition is generally poor, despite the relatively slowly growing pattern of the tumor. In 65% of cases, alveolar soft part sarcoma involves metastases,[15] which occur preferentially in the lung, bone and brain. The present patient, at presentation, exhibited metastatic nodules in the right lower lung.

In conclusion, ASPS appears to exhibit distinctive cytological features. Familarity with characteristic cytomorphology, coupled with the clinical presentation, and the immunohistochemical and ultrastructural features, can facilitate a confident diagnosis of ASPS.

REFERENCES

1. Christopherson WM, Foote FW Jr, Stewart FW. Alveolar soft-part sarcomas; structurally characteristic tumors of uncertain histogenesis. *Cancer* 1952;5:100-11.
2. Ordonez N, Ladanyi M. Alveolar soft part sarcoma. In : Fletcher CDM, Unni KK, Mertens F. WHO Classification of Tumours. Pathology and Genetics. Tumours of Soft Tissue and Bone. Lyon, IARC Press: 2002;208-10.
3. Kempson RL, Fletcher CDM, Evans HL, Hendrickson MR, Sibley RK. Atlas of Tumor Pathology. Tumors of the Soft Tissues. 3rd series. Washington DC.: Armed Forces Institute of Pathology, 2001;467-72.
4. Han HS, Park IS, Han JY, et al. Fine needle aspiration cytology of alveolar soft part sarcoma. A case report. *Korean J Cytopathol* 2000;11:115-9.
5. Kim DS, Oh YL, Ko YH. Alveolar soft part sarcoma of the lung diagnosed by fine needle aspiration biopsy. A case report. *Korean J Cytopathol* 1998;9:187-91.
6. Lopez-Ferrer P, Jimenez-Heffernan JA, Vicandi B, Gonzalez-Peramato P, Viguer JM. Cytologic features of alveolar soft part sarcoma: report of three cases. *Diagn Cytopathol* 2002;27:115-9.
7. Logrono R, Wojtowycz MM, Wunderlich DW, Warner TF, Kurtycz DF. Fine needle aspiration cytology and core biopsy in the diagnosis of alveolar soft part sarcoma presenting with lung metastases. A case report. *Acta Cytol* 1999;43:464-70.
8. Husain M, Nguyen GK. Alveolar soft part sarcoma. Report of a case diagnosed by needle aspiration cytology and electron microscopy. *Acta Cytol* 1995;39:951-4.
9. Wakely P. Jr. Epithelioid/granular soft tissue lesions: correlation of cytopathology and histopathology. *Ann Diagn Pathol*

2000;4:316-28.
10. Machhi J, Kouzova M, Komorowski DJ, et al. Crystals of alveolar soft part sarcoma in a fine needle aspiration biopsy cytology smear. A case report. *Acta Cytol* 2002;46:904-8.
11. Fukuda T, Saito M, Nakajima T. Giemsa staining for alveolar soft part sarcoma. *Acta Cytol* 1999;43:519-21.
12. Tsou MH, Lin HH, Chen CM. Intracytoplasmic crystals of alveolar soft part sarcoma: demonstration by Riu's stain. *Acta Cytol* 1997;41:1234-6.
13. Ordonez NG, Ro JY, Mackay B. Alveolar soft part sarcoma. An ultrastructural and immunocytochemical investigation of its histogenesis. *Cancer* 1989;63:1721-36.
14. Rosai J, Dias P, Parham DM, Shapiro DN, Houghton P. MyoD1 protein expression in alveolar soft part sarcoma as confirmatory evidence of its skeletal muscle nature. *Am J Surg Pathol* 1991;15:974-81.
15. Portera CA Jr, Ho V, Patel SR, et al. Alveolar soft part sarcoma: clinical course and patterns of metastasis in 70 patients treated at a single institution. *Cancer* 2001 91:585-91.