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Fine Needle Aspiration Cytology of Langerhans Cell Histiocytosis of Mandible
-A Case Report -

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We present a case of mandibular involvement with Langerhans cell histiocytosis (LCH), diagnosed by ultrasound-guided aspiration and subsequently confirmed by incisional biopsy and immunohistochemistry in an eight-year-old boy. The cytologic findings included the presence of characteristic Langerhans cells of both mononucleate and multinucleate form. Diagnostic confirmation was obtained by immunopositivity for S-100 protein and CD1a of Langerhans histiocytes on paraffin-embedded sections obtained during incisional biopsy of the right mandibular area. By reporting a case of childhood LCH, we correlate the cytologic findings with histologic features and discuss the role of aspiration cytologic diagnosis in such a rare and cytomorphologically characteristic case.

Key Words : Histiocytosis; Langerhans cell; Mandible; Cytology; Child

Langerhans cell histiocytosis (LCH), a disorder of antigen-presenting cells, is a rare disease with an estimated incidence of one case per 1,000,000 children younger than 15 years.[1] LCH is characterized by clonal proliferation and excess accumulation of pathologic Langerhans cells (LCs). The disease varies widely in its clinical presentation from localized involvement of a single bone to a widely disseminated life-threatening disease.[2]

CASE REPORT

An eight-year-old boy presented with swelling of the right mandibular area of six weeks' duration. The lesion was not accompanied by fever or tenderness. Other physical examination and laboratory tests were unremarkable.

The patient had undergone medical treatment for this symptom at a primary clinic during the past month, however, the symptoms had not improved. For a more detailed evaluation, a computer tomogram was performed.

On the computer tomogram of neck, an ill-defined, lobulating contour mass measuring 2.4 × 1.7 cm, was identified in the right mandible. The mass had destroyed the cortex of the mandible and extended into the right masticator space (Fig. 1). As the radiologic differential diagnoses included histiocytosis, Ewing's sarcoma, osteosarcoma, rhabdomyosarcoma, and chronic osteomyelitis, an ultrasound-guided aspiration and a subsequently incisional biopsy were performed.

On cytologic examination, the smears were highly cellular and polymorphic, and were predominantly composed of histiocytes, polymorphonuclear cells, lymphocytes and eosinophils. The histiocytes appeared as both dissociated single cells and as loosely cohesive clusters. The cells were characterized by abundant vacuolated cytoplasm with round nuclei. The nuclei were sometimes folded and had a fine granular chromatin pattern with 1-2 prominent nucleoli. Some of these cells were binucleated or multinucleated. Multinucleated cells had 3-38 similar nuclei with abundant cytoplasm. Mitotic figures were occasionally noted. The cytologic features of these histiocytes are consis-

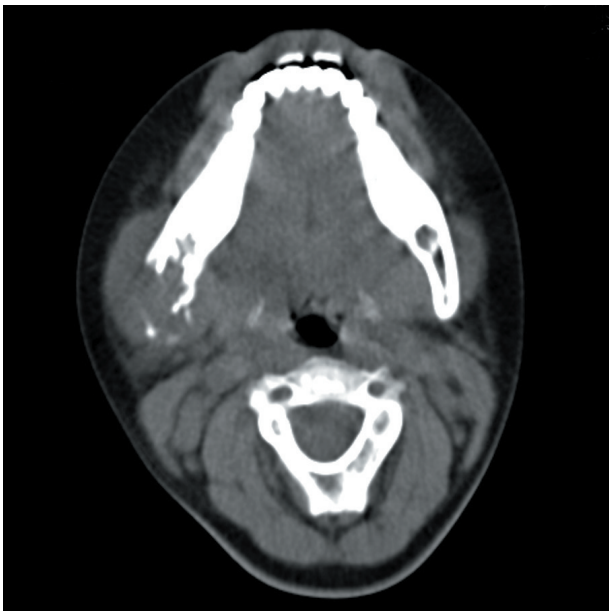

Fig. 1. Computed tomogram of the neck. A 2.4 × 1.7 cm sized lobulated contour mass which destroys the cortex of the mandible and extends into the right masticator space, is identified in the right mandible.

tent with LCs (Fig. 2).

On histologic sections, there was diffuse infiltration of LCs admixed with multinucleated giant cells, polymorphonuclear cells, and lymphocytes in fibromuscular tissue (Fig. 3). The singly scattered LCs in the paraffin-embedded tissue sections were strongly positive for both S-100 protein and CD1a (Fig. 4). However, the multinucleated giant cells were negative for S-100 protein and for CD1a. The multinucleated giant cells were considered as osteoclastic giant cells caused by bone destruction of the tumor.

DISCUSSION

The LCH can affect persons of any age, from neonates to the elderly, and its clinical presentation varies from localized involvement of a single bone to a disseminated life-threatening disease. However, most patients are children or adolescents and bone lesion is the most common manifestation in childhood LCH. Any bone may be involved except for those of the hands and

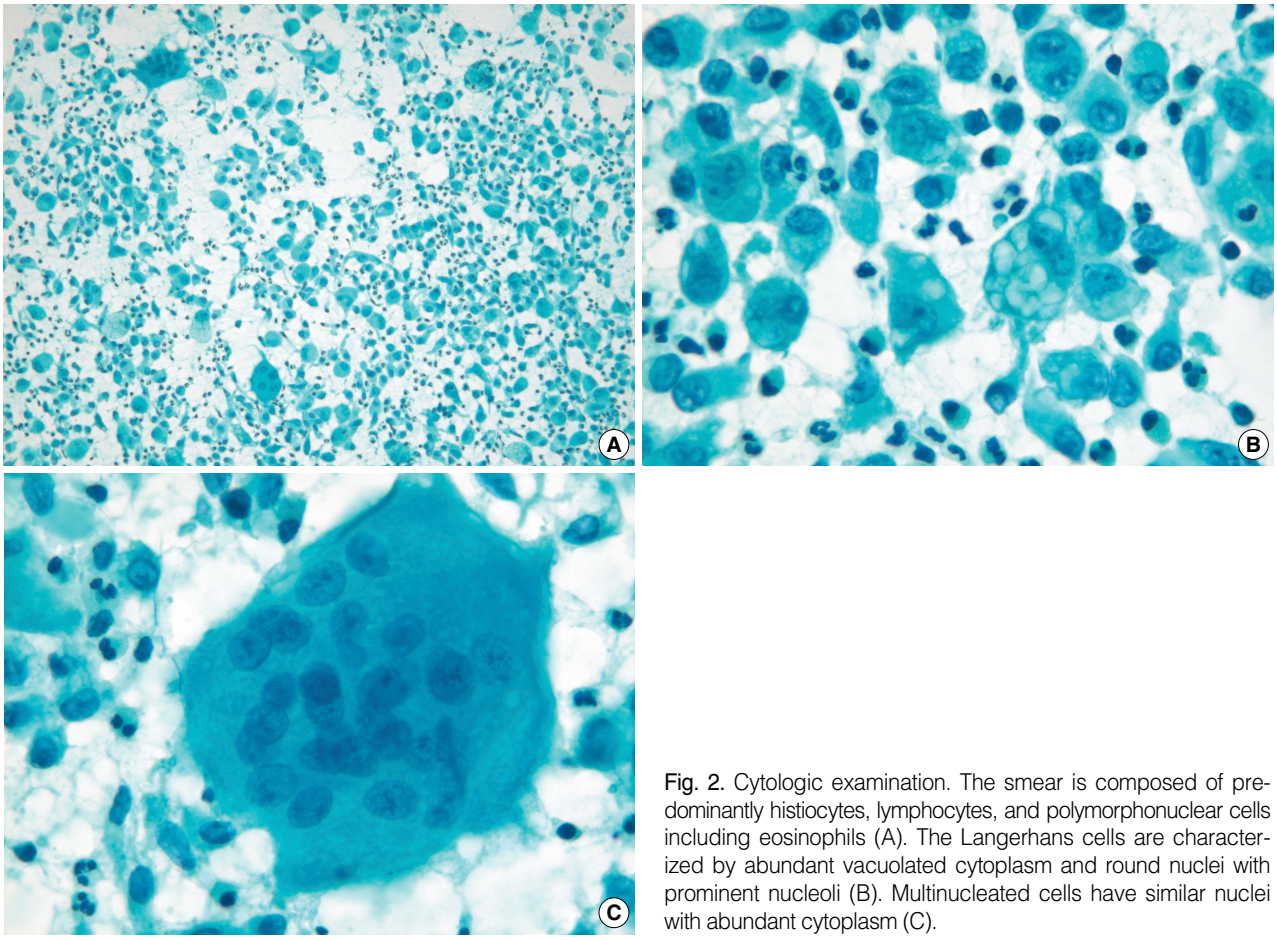

Fig. 2. Cytologic examination. The smear is composed of predominantly histiocytes, lymphocytes, and polymorphonuclear cells including eosinophils (A). The Langerhans cells are characterized by abundant vacuolated cytoplasm and round nuclei with prominent nucleoli (B). Multinucleated cells have similar nuclei with abundant cytoplasm (C).

feet, although the most common presentation of LCH in childhood is a single mass lesion on the skull. It usually presents with swelling and/or pain.[3]

The cytologic findings on fine needle aspiration (FNA) have recently been described. There is predominantly a mixture of histiocytes, eosinophils, neutrophils, and lymphocytes. The histiocytic cells have abundant cytoplasm, sometimes vacuolated. The nuclei are basically kidney-shaped but may be rounded or lobulated and a distinctive irregular and folded outline resembling a 'coffee-bean' is not uncommon. Multinucleated giant cells resembling osteoclasts may also be present.[4-7]

The important differential diagnoses are osteomyelitis with abundant histiocytes, and lesions with abundant giant cells, such as chondroblastoma, giant cell tumor, or aneurismal bone cyst. For the differential diagnosis, it is important to correlate with the patient's clinical history as well as cytologic features.

The metaphysis of long bones is the classical site for osteomyelitis to develop in children and aspirates are pus-like smears and dominated by neutrophils. Chondroblastoma involves the epiphysis of long bones. FNA smear shows a mixed pattern of chondroid matrix fragments, cells of the chondroblastic type and multinucleated osteoclast-like cells.

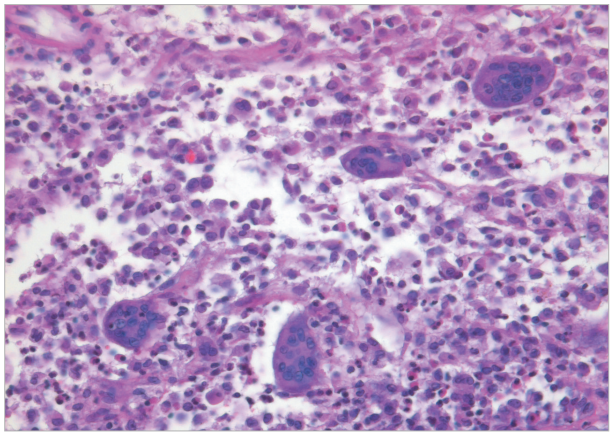

Fig. 3. Histologic examination shows a mixture of histiocytes, multinucleated giant cells, polymorphonuclear cells, and lymphocytes.

Typical cell clusters of giant cell tumor are composed of tightly packed mononuclear cells with uniform nuclei and a peripheral row of giant cells.

The characteristic finding of FNA material in an aneurismal bone cyst is a very large amount of blood. Aspirates usually show sparse cellularity and are composed of scattered osteoclastic cells, spindle-shaped fibroblastic cells, and haemosiderin-laden macrophages.

A strong immunopositivity for S-100 protein and CD1a of LCs as well as identification of characteristic Birbeck granules by electron microscopy, are most valuable for establishing the correct diagnosis. In our case, electron microscopic examination was not performed, however, histologic sections show immunopositivity for S-100 protein and CD1a.

The prognosis of LCH depends on the number of organs involved as well as the presence of organ dysfunction. When multiorgan involvement is also present, the patient's age at the onset of the disease is the only important prognostic factor.[8,9] In general, patients who present at a younger age and those with widely disseminated disease and organ dysfunction have the highest mortality rate. According to several studies, involvement of the spleen, lung, liver or the hematopoietic system also generally indicates a poor prognosis.[7,10,11] Treatment also depends on the number, and type of organ systems involved as well as the presence or absence of organ dysfunction.[7]

The cytologic features of LCH are highly characteristic and serve as a key point in suggesting a diagnosis. Therefore the pre-

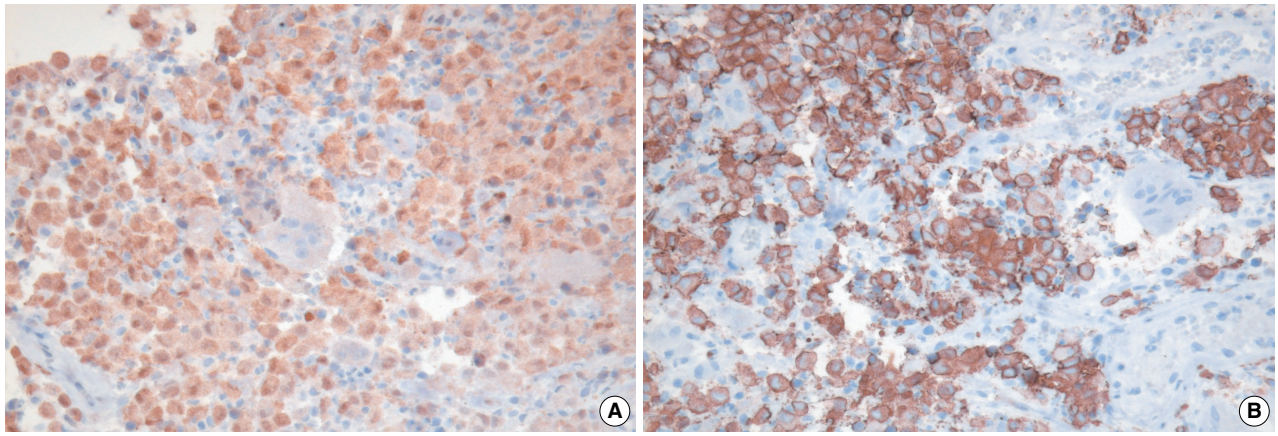

Fig. 4. The result of immunohistochemical staining. The Langerhans cells are strongly positive for both S-100 protein and CD1a.

sence of a mixed population of small mature lymphocytes, eosinophils, and abundant histiocytes on cytology, along with appropriate clinical findings, should suggest LCH and confirming studies should be performed.

REFERENCES

1. Favara BE, McCarthy RC, Mierau GW. Histiocytosis X. Hum Pathol 1983; 14: 663-76.
2. Weitzman S, Egeler RM. Langerhans cell histiocytosis: update for the pediatrician. Curr Opin Pediatr 2008; 20: 23-9.
3. Fernández-Latorre F, Menor-Serrano F, Alonso-Charterina S, Arenas-Jiménez J. Langerhans' cell histiocytosis of the temporal bone in pediatric patients: imaging and follow-up. AJR Am J Roentgenol 2000; 174: 217-21.
4. Åkerman M, Domanski HA. Fine needle aspiration (FNA) of bone tumours: with special emphasis on definitive treatment of primary malignant bone tumours based on FNA. Curr Diagn Pathol 1998; 5: 82-92.
5. Akhtar M, Ali MA, Bakry M, Sackey K, Sabbah R. Fine-needle aspiration biopsy of Langerhans histiocytosis (histiocytosis-X). Diagn Cytopathol 1993; 9: 527-33.
6. Elsheikh T, Silverman JF, Wakely PE Jr, Holbrook CT, Joshi VV. Fine-needle aspiration cytology of Langerhans' cell histiocytosis (eosinophilic granuloma) of bone in children. Diagn Cytopathol 1991; 7: 261-6.
7. Kobayashi TK, Ueda M, Nishino T, *et al*. Langerhans cell histiocytosis of the skull on cytologic squash preparations. Diagn Cytopathol 2007; 35: 154-7.
8. Lahey E. Histiocytosis x: an analysis of prognostic factors. J Pediatr 1975; 87: 184-9.
9. Satter EK, High WA. Langerhans cell histiocytosis: a review of the current recommendations of the Histiocyte Society. Pediatr Dermatol 2008; 25: 291-5.
10. Esterly NB, Maurer HS, Gonzalez-Crussi F. Histiocytosis X: a seven-year experience at a children's hospital. J Am Acad Dermatol 1985; 13: 481-96.
11. Querings K, Starz H, Balda BR. Clinical spectrum of cutaneous Langerhans' cell histiocytosis mimicking various diseases. Acta Derm Venereol 2006; 86: 39-43.