Langerhans cell histiocytosis of the sphenoid sinus: a case report

Guohua Yu[1], Fei Huang[2], Lingling Kong[3], Xiangmei Kong[3], Luping Zhang[2], Qing Xu[3]

[1]Department of Pathology, Yuhuangding Hospital, and [2]Department of Human Anatomy, Binzhou Medical University, and [3]Binzhou Medical University, Yantai, China

SUMMARY: Yu G, Huang F, Kong L, Kong X, Zhang L, Xu Q. Langerhans cell histiocytosis of the sphenoid sinus: a case report. Turk J Pediatr 2010; 52: 548-551.

Langerhans cell histiocytosis (LCH), previously known as histiocytosis X, is a rare disorder characterized by clonal proliferation and excess accumulation of pathologic Langerhans cells causing local or systemic effects. Bone is the most common organ involved and a single skull lesion is the most frequent presentation of childhood LCH. However, sphenoid sinus is an uncommon condition of involvement in LCH. Here we report a case of LCH in the sphenoid sinus, which occurred in a seven-year-old girl who presented initially with headache. The girl had suffered from headache for one month before she went to an otorhinolaryngologist one week before. Magnetic resonance imaging (MRI) showed a lesion of inflammatory granuloma. Surgery was performed and the disease was diagnosed pathologically as single-site LCH via hematoxylin-eosin (H&E) and immunohistochemical staining.

Key words: Langerhans cell histiocytosis, sphenoid sinus, children.

Langerhans cell histiocytosis (LCH) is characterized by the organic or tissular infiltration of cells with many morphologic features and immunohistochemical markers of Langerhans cells. In 1987, the Writing Group of the Histiocyte Society proposed a working classification of the histiocytosis in which the designation of "Langerhans cell histiocytosis" was formally adopted for this disease (class I). The familial and virus-associated hemophagocytic syndromes, Rosai-Dorfman disease and juvenile xanthogranuloma, were classified in class II, while malignant histiocytic disease formed the class III category[1]. To date, the accurate etiology of LCH is still undiscovered. Whether LCH is caused by a clonal neoplastic disorder or immune dysregulation remains to be answered. Although LCH can be seen at any age, it is predominantly a disease of childhood. Recently, a retrospective analysis reported that the median age was 3.5 years at diagnosis and the male/female ratio was 1.8:1[2]. The clinical manifestation of LCH varies from a single-system involvement to a multisystem fatal disease, and as a result, the diagnosis of LCH is usually missed. Bone seems to be very susceptible to LCH, and the most frequently involved sites include the skull, femur, mandible, pelvis, and spine. The sphenoid sinus is an uncommon site of LCH, and to our best knowledge, only 12 cases have been reported to the present[3,4]. In the present study, we report a case of a solitary LCH of the sphenoid sinus and discuss the clinical, histopathological and immunohistochemical features.

Case Report

A seven-year-old girl presented with a one-month history of headache. Amoxicillin was taken orally and the symptom was ameliorated. One week later, the girl was brought to our Department of Otorhinolaryngology because of the recurrence of headache. No abnormal physical sign in the nervous system was found during the medical examination and the patient did not have diabetes insipidus. Magnetic resonance imaging (MRI) revealed that the diseased region was located in the sphenoid sinus and circumambient soft tissue was involved (Fig. 1). The result of the MRI suggested that the lesion may be inflammatory granuloma. Her complete blood counts,

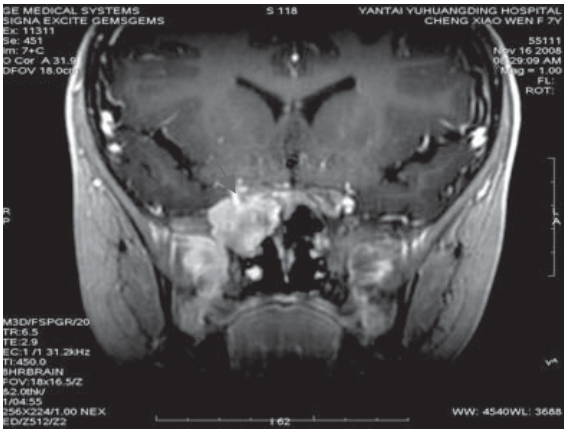

Fig. 1. MRI showed the lesion located in the sphenoid sinus (arrow) and involvement of circumambient soft tissue.

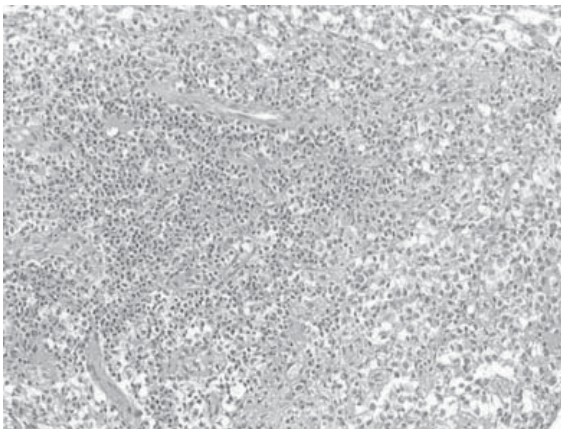

Fig. 2. Histology showed the tumor was made up of proliferative histiocytes on the background of lymphocytes and eosinophils (H&E staining, original magnification ×40).

erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), blood biochemistry, electrolytes, blood urea nitrogen, serum creatinine, urine analysis, and the endocrine profile were within normal ranges except for elevations of alkaline phosphatase (201 IU/L) and uric acid (376.9 μmol/L). The chest X-ray, lateral radiographs of the cervical spine, technetium bone scan, and the abdominal ultrasonography did not reveal any other abnormality.

Surgery through rhinal endoscopy was performed with the patient under general anesthesia. There was a yellow neoplasm in the anterior sphenoidal wall and a biopsy was taken. Histology showed that the tumor was made up of proliferative histiocytes on the background of lymphocytes and eosinophils (Fig. 2). Histiocytes had round nuclei, moderate amount of pink granular cytoplasm and typical nuclear grooves (Fig. 3). With the immunohistochemical technique, histiocytes were stained positively with antibody to S100, CD1a and CD68 protein (Fig. 4) and negatively with antibody to CD3, CD20, CD21, CD30, CD34, CD99, and AE1/AE3. The positive rate of Ki67 was less than 5% (all the primary antibodies were purchased from the Fuzhou Maixin Co., China). Based on the clinical manifestations, the presence of Langerhans cells with distinctive nuclear morphology on light microscopy, and positivity of S100 and CD1a, a diagnosis of single-site LCH of the sphenoid sinus was made and the patient simply received surgical treatment. The total follow-up period after surgery was 16 months and the repeated computerized tomography (CT) scans revealed no recurring or residual lesion.

Discussion

Langerhans cell histiocytosis (LCH) is a rare disorder of unknown cause and was previously called histiocytosis X, which was first described by Lichtenstein in 1953[5]. LCH is defined as an abnormal proliferation of the Langerhans cells in many organs or tissues, such as lymph gland, liver, lung, skin, and bones[2,6,7]. Involvement of the sphenoid sinus by the lesion is rare.

Clinically, LCH can occur at any age but much more commonly in children[1,2,6]. The incidence of childhood LCH is estimated to be 3:100,000 per year and the majority of patients are

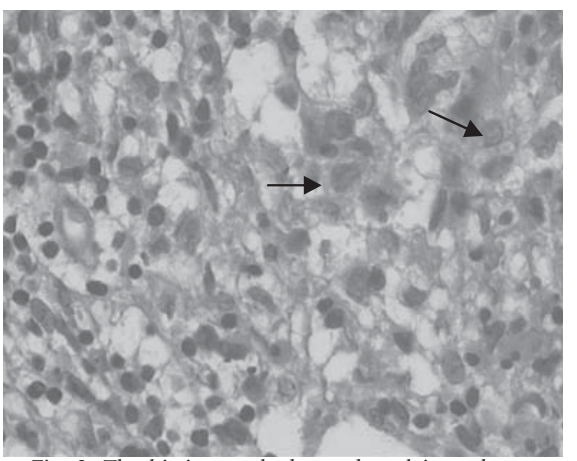

Fig. 3. The histiocytes had round nuclei, moderate amount of pink granular cytoplasm and typical nuclear grooves (arrows)

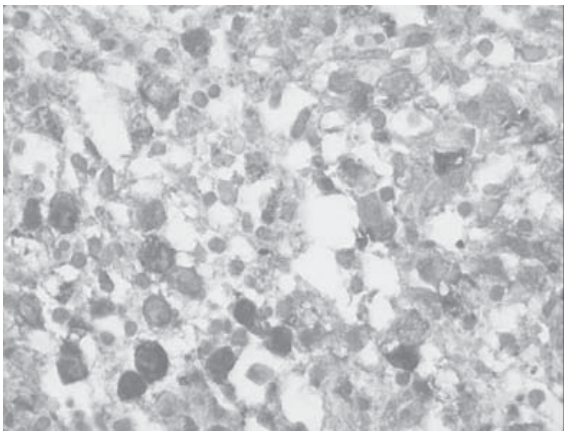

Fig. 4. The histiocytic cells expressed S-100 protein positively

younger than 10 years. LCH is presumed by some scholars to be a reactive process because of immunological abnormality, but more and more researchers swing the pendulum towards considering LCH as one kind of tumor[8,9]. With current sophisticated techniques, clonal expansion of histiocytes in all forms of LCH has been proven.

The diagnosis of LCH is regarded as presumptive when the typical morphological characteristics of Langerhans cells are seen with light microscopy, and as designated when additional stains such as CD1a and S100 are positive[10]. Data accumulated during the last few years suggest that Langerin (CD207), an endocytic receptor that induces the formation of Birbeck granules, is a novel protein specific to Langerhans cells[11,12]. In the sphenoid sinus, other histological differential diagnoses, including lymphoma, osteomyelitis, primary Ewing's sarcoma, giant cell tumor of the sphenoid, and local extension from nasopharyngeal carcinoma, should be cautiously considered; properly performed immunohistochemistry could be helpful for a correct diagnosis.

In 1990, the LCH Study Group adopted a stratification system with division of LCH into two major categories: (1) "Single-system" LCH: subdivided further into single site (unifocal bone, skin or lymph node) and multiple sites (multifocal bone or multiple lymph nodes); (2) "Multisystem (MS)" LCH: defined as involvement of two or more organs at diagnosis with or without organ dysfunction; MS-LCH is subdivided into a "low-risk" and a "risk" group. Low-risk patients have an excellent prognosis and are characterized by the absence of involvement of "risk" organs such as liver, lungs, spleen, or the hematopoietic system. "Risk" patients have at least one or more risk organs involved and a high mortality rate[13]. Patients with single-system LCH generally have a high chance of spontaneous remission and a favorable prognosis, while patients with MS-LCH with or without organ dysfunction must receive chemotherapy. Analysis has shown that age younger than two years, pulmonary, liver, or hematological involvement, and elevated acute-phase reactants such as ESR or CRP might be significant factors that determine poor outcome[2].

The treatment modality for the patient presented herein was simple observation after surgery. The follow-up CT scans over 16 months disclosed no palindromic lesion, which is in accordance with other patients who suffered solitary LCH in the sphenoid sinus and remained asymptomatic or without neurological deterioration after therapy[3,4]. We conclude that single site LCH in the sphenoid sinus tends to be inertial or benign.

Acknowledgements

We thank Professor Xianghong Li from the Department of Pathology in Cancer Hospital, Beijing, for consulting on this case. This article was supported by the Program for New Century Excellent Talents in University (No. NCET-08-0876).

REFERENCES

1. Writing Group of the Histiocyte Society. Histiocytosis syndrome in children. Lancet 1987; 1: 208-209.
2. Yağci B, Varan A, Cağlar M, et al. Langerhans cell histiocytosis: retrospective analysis of 217 cases in a single center. Pediatr Hematol Oncol 2008; 25: 399-408.
3. Hussain SS, Simpson RD, McCormick D, Johnstone CI. Langerhan's cell histiocytosis in the sphenoid sinus: a case of diabetes insipidus. J Laryngol Otol 1989; 103: 877-879.
4. Krishna H, Behari S, Pal L, et al. Solitary Langerhans-cell histiocytosis of the clivus and sphenoid sinus with parasellar and petrous extensions: case report and a review of literature. Surg Neurol 2004; 62: 447-454.
5. Lichtenstein L. Histiocytosis X; integration of eosinophilic granuloma of bone, Letterer-Siwe disease, and Schüller-Christian disease as related manifestations of a single nosologic entity. AMA Arch Pathol 1953; 56: 84-102.

6. Tokuç G, Boran P, Öktem S. Langerhans cell histiocytosis in Turkish children. Turk J Pediatr 2009; 51: 344-349.
7. Puigdevall M, Bosio S, Hokama J, Maenza R. Langerhans cell histiocytosis of the atlas in the pediatric spine: total reconstitution of the bone lesion after nonoperative treatment. A report of two cases. J Bone Joint Surg Am 2008; 90: 1994-1997.
8. Murakami I, Gogusev J, Fournet JC, et al. Detection of molecular cytogenetic aberrations in Langerhans cell histiocytosis of bone. Hum Pathol 2002; 33: 555-560.
9. Christie LJ, Evans AT, Bray SE, et al. Lesions resembling Langerhans cell histiocytosis in association with other lymphoproliferative disorders: a reactive or neoplastic phenomenon? Hum Pathol 2006; 37: 32-39.
10. Leonidas JC, Guelfguat M, Valderrama E. Langerhans' cell histiocytosis. Lancet 2003; 361: 1293-1295.
11. Dziegiel P, Dolilńska-Krajewska B, Dumańska M, et al. Coexpression of CD1a, langerin and Birbeck's granules in Langerhans cell histiocytoses (LCH) in children: ultrastructural and immunocytochemical studies. Folia Histochem Cytobiol 2007; 45: 21-25.
12. de Witte L, Nabatov A, Pion M, et al. Langerin is a natural barrier to HIV-1 transmission by Langerhans cells. Nat Med 2007; 13: 367-371.
13. Broadbent V, Gadner H. Current therapy for Langerhans cell histiocytosis. Hematol Oncol Clin North Am 1998; 12: 327-328