

## Pediatric Langerhans Cell Histiocytosis of the Temporal Bone: A Rare Case Report and Review of Literature

### Abstract

Langerhans cell histiocytosis (LCH) is a rare cancer involving clonal proliferation of Langerhans cells (LCs) resembling epidermal dendritic cells. It can involve any organ or system. Temporal bone LCH is often confused with ear inflammatory lesions and malignant tumors. Diagnosis is based on clinical, radiological, and pathological findings. The definitive diagnosis is made on biopsy and by immunohistochemical demonstration of CD 1a and/or Langerin positivity in the clonally neoplastic cells. The course of LCH is variable from spontaneous regression to repeated recurrences and death. The main form of treatment is chemotherapy. We describe a case of multifocal multisystem LCH in a 4-year-old child who presented with recurrent chronic suppurative otitis media and an external auditory canal polyp.

**Keywords:** Chronic suppurative otitis media, ear polyp, Langerhans cell histiocytosis, temporal bone

### Introduction

Langerhans cell histiocytosis (LCH) is an inflammatory cell proliferative disorder of unknown etiology with variable clinical presentation. The annual incidence of LCH is approximately 5.4 cases per million people. It has a tendency to affect young adults and children with a male predominance. About 50%–80% of pediatric LCH is found in the head-and-neck regions.<sup>[1]</sup> The temporal bone is involved in approximately 15%–60% of cases in this region, and its bilateral occurrence is described in up to 30% of the cases, so evaluation of both the ears is necessary. This manifestation is more frequent in children with multisystem disease and is a primary manifestation in 5%–25% of patients.<sup>[2]</sup>

The etiopathogenesis of disease is still not clear, but viral infections and genetic factors play an important role.<sup>[3]</sup> The typical radiological finding of LCH is a shining lesion, with sclerotic margins and a beveled edge, along with homogeneous soft-tissue masses enhancing uniformly with the administration of intravenous contrast.<sup>[4]</sup> The histopathological diagnosis on biopsy

is the gold standard to confirm the disease, with immunohistochemistry (IHC) showing LCs associated with an inflammatory infiltrate consisting of lymphocytes, plasma cells, giant cells, and large numbers of eosinophils.<sup>[5]</sup>

Here, we describe the clinical manifestations, mode of diagnosis, treatment, and prognosis of this disease along with the relevant review of literature.

### Case Report

A 4-year-old male child presented in the ENT outpatient department with bilateral ear discharge for 4 months. He had already completed three courses of antibiotics for recurrent bilateral chronic suppurative otitis media (CSOM) as prescribed by local practitioners. Now, he was also giving complaints of inability to walk and giddiness for 2 days. On external examination, blood-stained discharge was present in both the ears. A small polypoidal tissue was seen in the right external auditory canal, whereas the left auditory canal was edematous. The tympanic membrane was not visible in both the ears. Facial nerves were intact, spontaneous nystagmus was not present, and fistula test was negative bilaterally. Hearing thresholds were normal in both the ears. Routine blood investigations were normal.

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Magnetic resonance imaging (MRI) of the brain revealed large altered signal intensities in the region of bilateral external and middle ears involving the temporal bone [Figure 1]. A well-defined ovoid expansile lesion was seen involving the skull vault in the left high parietal region measuring approximately 18 mm × 9 mm. MRI of the whole spine was not significant.

Contrast-enhanced computed tomography (CT) head revealed 20 mm × 22 mm lytic lesion with mild enhancing soft-tissue component and beveling of margins in the left parietal bone with the destruction of the inner and outer cortices, and intracranial extension was not seen. High-resolution CT temporal bone with contrast revealed mild heterogeneously enhancing lytic destruction soft-tissue lesion involving the squamous and mastoid portion of the bilateral temporal bone with the involvement of bilateral external ear canal and extension of lesion in the middle ear cavity and left occipital bone along with the destruction of the dural sinus plate over the sigmoid sinus and bilateral

tegmen tympani. The inner ears and bony facial canals were normal.

The polypoidal tissue was excised and sent for histopathological examination. The biopsy was received in multiple grey-brown soft tissue pieces measuring together 0.3 × 0.2 × 0.1 cm. Microscopy revealed the presence of large round-to-polygonal atypical cells with convoluted and reniform nucleus, delicately clumped nuclear chromatin, conspicuous nucleoli in few and moderate-to-abundant pale cytoplasm conforming to the morphology of LCs along with few giant cells, eosinophils, neutrophils, and plasma cells [Figure 2]. Histological features were in favor of Langerhan cell histiocytosis.

On IHC, these atypical cells were positive for CD68, CD1a, and S-100 [Figures 3 and 4], confirming to the clinical, radiological, and morphological diagnosis of LCH.

The whole-body positron-emission tomography-CT scan was done to evaluate the extent of disease. Metabolically active multiple site lytic lesions with soft-tissue

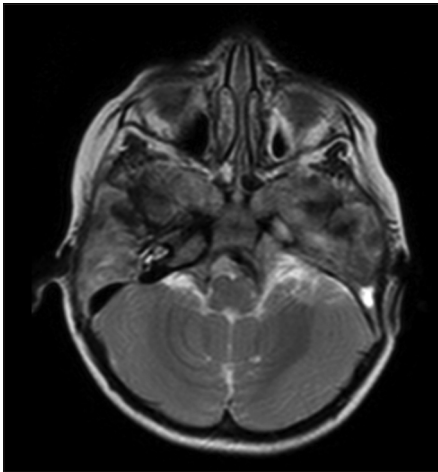


Figure 1: Large altered signal intensities in the region of bilateral external and middle ears involving the temporal bone (magnetic resonance imaging brain – axial view)

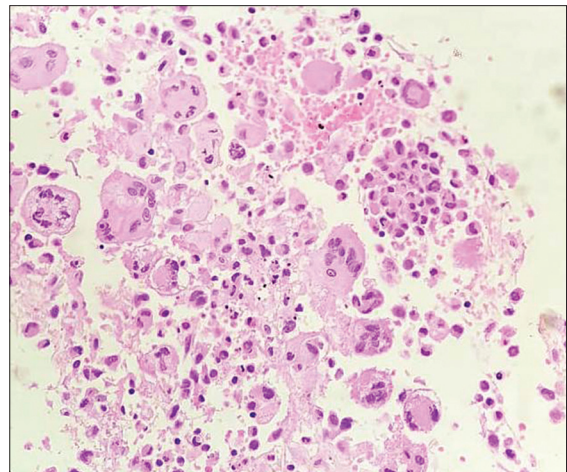


Figure 2: Langerhans cells along with few giant cells, eosinophils, neutrophils, and plasma cells (H and E, 200×)

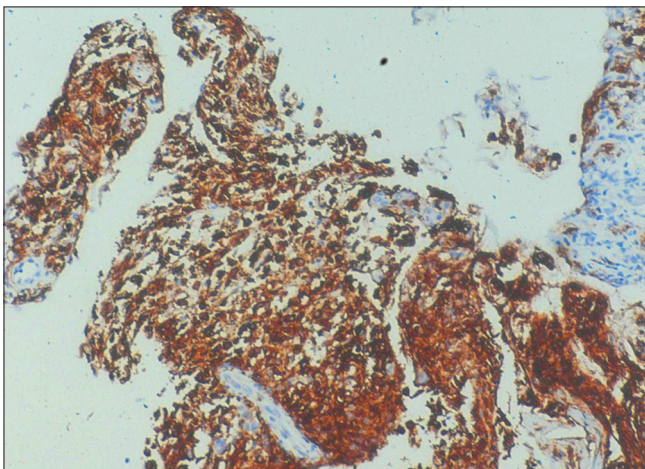


Figure 3: CD1A positivity confirms these cells as Langerhans cells (IHC, 100×)

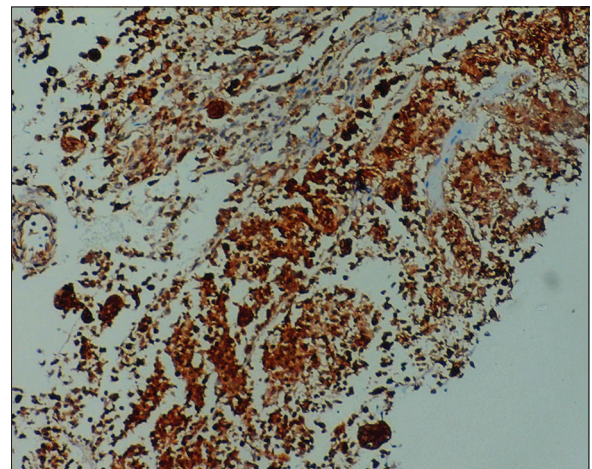


Figure 4: Langerhans cells show strong positivity for S-100 (IHC, 200×)

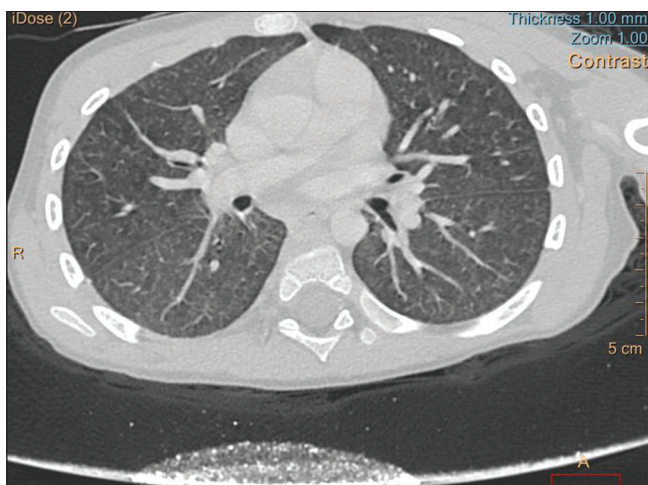
involvement were seen involving orbital surface of the left maxillary bone, inner table of the mandible bilaterally, left radius, and intramedullary lesion involving the mid shaft of the right femur, resulting in giddiness of the patient in the present case. Multiple, enlarged bilateral cervical Level II lymph nodes and mild splenomegaly were also seen. Multiple centriacinar nodules in both the lung parenchyma [Figure 5] and hypermetabolic subcutaneous fat stranding in the left side of the gluteal region overlying the sacrum were also observed.

Hence, chemotherapy with methotrexate and systemic steroids was started in view of multifocal multisystem disease along with septran prophylaxis and folinic acid rescue. Regular follow-up with routine hematological investigations is being done for 8 months. His ear symptoms are under control, and the patient is currently hemodynamically stable.

## Discussion

LCH is part of a group of clinical syndromes called histiocytosis, which are characterized by an abnormal proliferation of histiocytes. LCs or dendritic cells are antigen-processing cells located in the epidermis and lymph nodes. Recent studies have shown that LCs originate from monocyte precursors. The pathogenesis of LCH is a matter of debate whether LCH is a reactive or a neoplastic process. Reactive nature is supported by spontaneous remission and cytokine storm. Neoplastic nature is supported by clonal proliferation and association with BRAF gene.<sup>[6]</sup>

The first case of LCH was reported by Thomas Smith in 1865 in a child with impetigo and osseous lesions in the cranium. Later on, Hand, Schuller, and Christian described this disease in children with osseous lytic lesions, exophthalmos, and diabetes insipidus. In 1924, Letterer and Siwe described visceral disease with hepatosplenomegaly, cutaneous lesions, lymphadenopathy, and pneumonia.



**Figure 5:** Multiple centriacinar nodules seen in both the lung parenchyma (Contrast-enhanced computed tomography chest)

Lichtenstein in 1953 described the term histiocytosis X, later on Nezelof modified it to LCH in 1973.<sup>[7]</sup>

The annual morbidity of LCH is 3–5 cases per million in children. It can affect any organ or system. Clinically, its manifestations range from isolated bone lesions to multisystem disease. Depending on the organ system involvement, the disease has been classified into three groups: unifocal, multifocal unisystem, and multifocal multisystem. The mainly involved organs are bones, skin, lungs, liver, spleen, lymph nodes, bone marrow, and pituitary.<sup>[8]</sup> The otologic findings are often misdiagnosed as the patient usually presents with more common conditions such as CSOM, recurrent otitis externa, cholesteatoma, and mastoiditis. Hence, treatment is often delayed.

Diagnosis is confirmed histologically by tissue biopsy. Morphologically, LCH consists of collection of histiocytes, eosinophils, lymphocytes with few number of neutrophils, giant cells, and plasma cells. LCs are large mononuclear cells with few cytoplasmic vacuoles, having an oval grooved/notched nuclei with fine nuclear chromatin. Electron microscopy reveals the presence of characteristic tennis racket-shaped Birbeck granules, also called X-granules or Langerhans bodies.<sup>[9]</sup>

The treatment protocol depends on the extent and severity of disease. Solitary bone lesions may be treated with surgical excision alone or with limited radiation. However, systemic diseases often require chemotherapy with or without systemic steroids. Local steroid cream is applied to cutaneous lesions.<sup>[10]</sup>

Prognosis of LCH is variable from a rapid progressing fatal disease to spontaneous resolution. Poor prognostic factors include age <2 years, presence of cervical lymph nodes, scalp involvement, multiple system involvement, and vital organ dysfunction. Patients with lesions in target organs have more complications, worse outcomes, and high mortality.<sup>[11]</sup>

## Conclusion

The pediatric otic LCH must be suspected in a case with recurrent ear symptoms along with soft-tissue mass within ear and bony lesions. The biopsy together with IHC is the gold standard of diagnosis, and chemotherapy is the mainstay of treatment.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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