

# An Unusual Orbital Bone Lesion

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## ABSTRACT

**A case of Langerhans cell histiocytosis involving the left orbital ridge in an 11-year-old girl is reported. The clinical presentation, radiologic findings and histopathological features as well as diagnostic criteria for Langerhans cell histiocytosis are reviewed.**

**Keywords:** Langerhans cell histiocytosis, orbital involvement, S-100 protein antibody, OKT6 antibody, Birbeck granules

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## INTRODUCTION

Traditionally, the term histiocytosis X is used to refer to a group of diseases that includes eosinophilic granuloma, Hand-Schuller-Christian disease and Letterer-Siwe disease. These are believed to be different clinical expressions of a single disease entity. While the term eosinophilic granuloma is used to describe histiocytic lesions which usually arise from bone, Hand-Schuller-Christian disease refers to the triad of exophthalmos, bony defects of the skull and diabetes insipidus as well as the chronic disseminated form of histiocytosis X involving both bone and soft tissue. Letterer-Siwe disease is the most aggressive form, affecting mostly infants and children below the age of 3 years. It is characterised by widespread soft tissue and visceral involvement with or without bony lesions, and may run a fatal course<sup>(1)</sup>.

Recently, the Histiocyte Society<sup>(2)</sup> redefined the classification of histiocytosis. The new classification groups the wide spectrum of disease seen into 3 classes. Class I includes all the Langerhans cell histiocytosis in which the Langerhans cell is the pathognomonic histopathological finding. Class II refers to histiocytosis of mononuclear phagocytes other than the Langerhans cell whereas class III includes the malignant histiocyte disorders.

Orbital involvement in Langerhans cell histiocytosis is fairly commonly seen especially in patients with eosinophilic granuloma. Moore et al<sup>(3)</sup> reported a series of 76 children with histiocytosis X in which orbital

involvement was 24%. However, because histiocytosis X is itself an uncommon disease, the clinical picture of a patient with orbital Langerhans cell histiocytosis is not frequently encountered. We report a case of Langerhans cell histiocytosis involving the roof of the left orbit which eroded bone and dura, giving the clinical impression of malignancy.

## CASE REPORT

An 11-year-old Chinese girl presented with left upper eyelid swelling of 3 weeks' duration. She had been hit lightly on the left side of the forehead about a week before the swelling appeared. The swelling was gradually increasing in size and was associated with slight pain.

Examination showed that best-corrected vision in the left eye was 6/12 and in the right 6/7.5. There was a cystic, fluctuant and slightly tender mass on the lateral aspect of the left upper lid causing an s-shaped ptosis. There was also slight proptosis of the left eye.

Computed tomography showed a left frontal bone defect with what appeared to be a cystic mass arising from the bone. Magnetic resonance imaging was employed to further delineate the extent of the lesion. This showed an infiltrating mass measuring 3.1 x 3 x 2 cm originating from the left supraorbital rim and roof of the orbit and compressing the left globe. There was infiltration of the dura of the left frontal lobe but not involving the lobe itself. The temporal muscles were



**Fig. 1** Left upper eyelid swelling causing an s-shaped ptosis.

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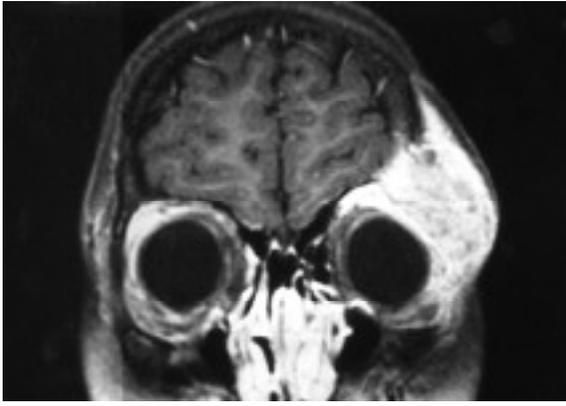
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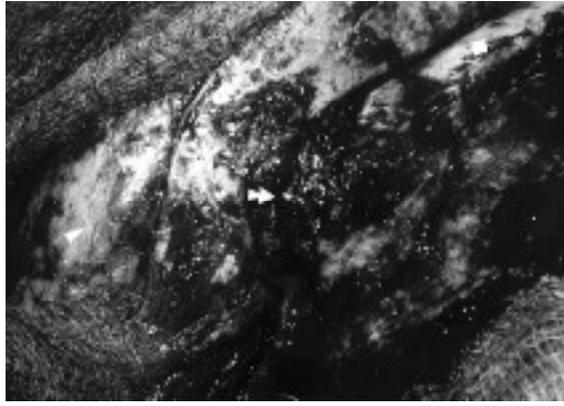
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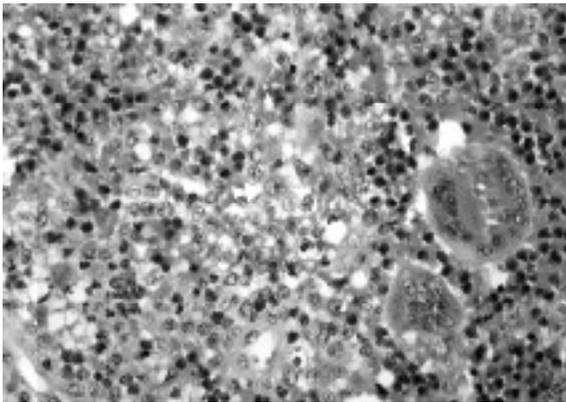
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**Fig. 2** Coronal CT scan showing an infiltrative mass arising from the superotemporal orbital rim.



**Fig. 3** Arrow: Infiltrative mass arising from a defect in the left supraorbital ridge. Triangle: Reflected pericranial tissue. Square: Unaffected supraorbital ridge.



**Fig. 4** Histopathological section showing Langerhans cell (arrow), eosinophils and multinucleated giant cells (haematoxylin and eosin;x200).



**Fig. 5** Excellent cosmetic result post-op.

also spared. The low to intermediate signal on the T2-weighted images indicated probable high cellularity.

A combined team approach was undertaken in view of the dural involvement and the need for orbital reconstruction following excision. The neurosurgeon and plastic surgeon were consulted and the common opinion was that this was a rapidly growing tumour and probably malignant. The differential diagnosis of Langerhans cell histiocytosis was not ruled out.

Left frontal craniotomy, macroscopic excision of the lesion and left orbital reconstruction with duraplasty was performed 5 days after admission. Intra-operatively, a purplish mass was seen arising from a defect in the left supraorbital ridge. It had spread into the orbit but was restrained by the orbital septum. Additionally, it was stuck down to the underlying dura but was separate from the brain tissue. Macroscopic excision was performed because the frozen section revealed the lesion to be either a eosinophilic granuloma or a xanthogranuloma. The involved dura was excised and patched with pericranium. Reconstruction of the left supraorbital ridge and roof of the orbit was performed using calvarial bone graft harvested from the left frontal bone flap.

Subsequent histopathology showed that the tumour as well as the affected bone and dura were infiltrated by irregular histiocytes mixed with eosinophils, lymphocytes and multinucleated giant cells. The

histiocytes stained positively with the antibody for S-100 protein, supporting the diagnosis of Langerhans cell histiocytosis.

Post-operatively, a whole-body bone scan was done which showed moderate increase in tracer activity at the site of surgery but no increased uptake elsewhere. The proptosis resolved and the visual acuity of the left eye returned to 6/7.5. No further treatment was deemed necessary as excision had been curative.

## DISCUSSION

Controversy still exists with regards to the aetiology of Langerhans cell histiocytosis. Recent reports in haematology-oncology journals have confirmed that Langerhans cell histiocytosis is due to monoclonal proliferation of activated Langerhans cells<sup>(4,5)</sup>. However, why this occurs is still largely unknown. The possible role of viruses, immune dysfunction, genetic predisposition and unknown environmental exposures have all been cited but not definitely proven<sup>(5,6)</sup>.

Whatever the aetiology, it is well known that there is a wide spectrum of presentation. In general, there are those with limited disease who run a relatively benign course and those with very diffuse disease which is resistant to multiple methods of therapy. In those with orbital involvement, the superotemporal orbital rim is most frequently involved. The lesion is typically

osteolytic and demonstrates an irregular sclerotic margin<sup>(1,6)</sup>. It invariably erodes through the bone but may be held back by the orbital septum on one side and the dura mater on the other.

In our patient, the clinical presentation and radiological findings were classical. The rapid onset and the invasive nature of the lesion, however, demanded that malignant conditions such as Ewing's sarcoma and lymphoma had to be excluded. The latter does not usually erode bone but may do so if it is of a high grade.

Recently, the Histiocyte Society defined objective criteria for diagnosing Langerhans cell histiocytosis<sup>(2)</sup>. According to the society, 2 or more of the following is required for a diagnosis: positive staining for adenosine triphosphate, S-100 protein antibody, alpha-mannosidase or peanut lectin binding. The Langerhans cell also stains positively for the monoclonal antibody OKT6. In addition, a definite diagnosis depends on the demonstration of Birbeck granules (racket-shaped or cylindrical cytoplasmic inclusions) by electron microscopy or positivity for CDI antigenic determinants on cryostat section. Generally, though, it is felt that it is sufficient to make the diagnosis of Langerhans cell histiocytosis based on the clinical picture, light microscopic appearance and the positive staining with the S-100 protein antibody<sup>(7)</sup>. Briefly, the light microscopic features include the presence of large histiocytes admixed with eosinophils, lymphocytes and plasma cells. The histiocyte or Langerhans cell exhibit large nuclei with distinct chromatin and nuclear membranes. Multinucleated cells and areas of necrosis may also be present.

With the confirmed diagnosis of Langerhans cell histiocytosis, the outlook for the child improved considerably. It is well known that Langerhans cell histiocytosis of the skull with juxtaneural involvement, while having an alarming radiological appearance, is associated with an excellent prognosis<sup>(6)</sup>. In our patient, the absence of diffuse disease was also a favourable factor.

The methods of treatment for Langerhans cell histiocytosis include close observation for spontaneous resolution, local injection of steroids, systemic steroids, surgical excision, low-dose radiotherapy, chemotherapy,

bone marrow transplantation and antibody therapy<sup>(6)</sup>. The choice of treatment modality will depend largely on the disease location, the extent of the disease and the surgical skills available. For limited disease which does not threaten vital organs, many physicians would opt to watch closely. Surgical excision or curettage is ideal for easily accessible lesions, eg. the flat bones of the skull. Chemotherapy in combination with systemic steroid is often indicated for multifocal disease that threatens vital tissues. The last two modalities are reserved for recalcitrant cases. The disadvantage of surgical intervention is the frequently extensive bony defect left after excision. In our patient, this was rectified by plastic reconstruction at the same time that the tissue was excised. The obvious advantage is that the undesirable side effects of chemotherapy and systemic steroid are avoided.

In the follow-up period, it must be borne in mind that Langerhans cell histiocytosis has been linked with the development of a malignant neoplasm such as acute leukaemia and lymphomas<sup>(8)</sup>. It is postulated that the treatment of the disease or a genetic predisposition may be the cause of the secondary malignancy. In our follow-up, our patient will thus be monitored not just for recurrence but for the development of any haematological malignancy.

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