Case Report | Journal of Orthopaedic Case Reports 2026 May:16(5):Page 199-204

# Solitary Diaphyseal Langerhans Cell Histiocytosis of Femur in an Infant – A Case Report

Kavin Sathish[1], T Shenbagavalli[1], S Chockalingam[1], P R Ramasamy[1]

**Learning Point of the Article:**

This experience illustrates the importance of keeping a less common diagnosis as a differential diagnosis. Histopathological examination plays a vital role in diaphyseal bone lesion in infants, as Unifocal LCH can mimic osteomyelitis or malignancy.


## Abstract

**Introduction:** Langerhans cell histiocytosis (LCH) is a group of idiopathic disorders characterized by proliferation of bone marrow-derived Langerhans cells. It has a multitude of presentations – ranging from unifocal single system disorder to multisystem disorder. Most of these present in childhood; however, rare cases have been reported in adulthood as well.

**Case Report:** Herein, 8 months old boy presented with refusal to weight bear on the right lower limb for 1 week. Mild elevation of C-reactive protein and white blood cell count. Plain Radiograph showed a lytic lesion in the femur with periosteal reaction. Magnetic resonance imaging showed a subperiosteal fluid collection suggestive and muscle inflammation. The patient was taken for curettage and biopsy of the lesion. Histopathology confirmed LCH, with positive for S100 (Histiolytic marker) and CD1a (Langerhan cell specific marker). Whole body positron emission tomography/Computed tomography confirmed a solitary lesion consistent with single system Unifocal bone LCH. Systemic therapy was initiated with the help of pediatric hematologist. Clinical and radiological outcome observed periodically. The patient was initially evaluated for osteomyelitis. However, we arrived at a diagnosis of LCH on the grounds of morphology and immunohistochemistry.

**Conclusion:** This case highlights the importance of biopsy for diagnosing bone lesions in infants, as unifocal LCH can mimic osteomyelitis or malignancy. We reported a case of diaphyseal femur LCH in an infant, which has not been reported in the Indian literature until now.


**Keywords:** Langerhans cell histiocytosis, femur, Infant, solitary bone lesion.

## Introduction

Langerhans cell histiocytosis (LCH) was formerly known as histiocytosis X, as the lesional cells were initially unknown. LCH demonstrates neoplastic proliferation of histiocytes and other inflammatory cells, leading to accumulation and pathological dissemination of histiocytes, resulting in destruction of hard and soft tissues.

The diagnosis of LCH is solely based on microscopic examination, and the disease is broadly categorized into three disorders based on the clinical presentations, namely, Hand Schuller Christian disease, Letterer Siwe disease and eosinophilic granuloma [1].

LCH is the most common pediatric histiocytic disorder, with an incidence of four to eight per million children. Although LCH can present at any age, it is primarily a disease of childhood, with a median age of 3–4 years, and has been reported even in infants under 1 year old. The disease ranges from unifocal single system to life-threatening multisystem involvement [2].

Access this article online

Website: www.jocr.co.in

DOI: https://doi.org/10.13107/jocr.2026.v16.i05.7256

*Author's Photo Gallery*


Dr. Kavin Sathish


Dr. T Shenbagavalli


Dr. S Chockalingam


Dr. P R Ramasamy

[1]Department of Orthopaedic Surgery, Kauvery Hospitals, Tiruchirapalli, Tamil Nadu, India,

**Address of Correspondence:**
Dr. Kavin Sathish,
Department of Orthopaedic Surgery, Kauvery Hospitals, No-6, Royal Road, Cantonment, Tiruchirapalli, Tamil Nadu, India.
**E-mail:** sathishkavin525@gmail.com

Submitted: 15/02/2026; Review: 07/03/2026; Accepted: April 2026; Published: May 2026

DOI: https://doi.org/10.13107/jocr.2026.v16.i05.7256

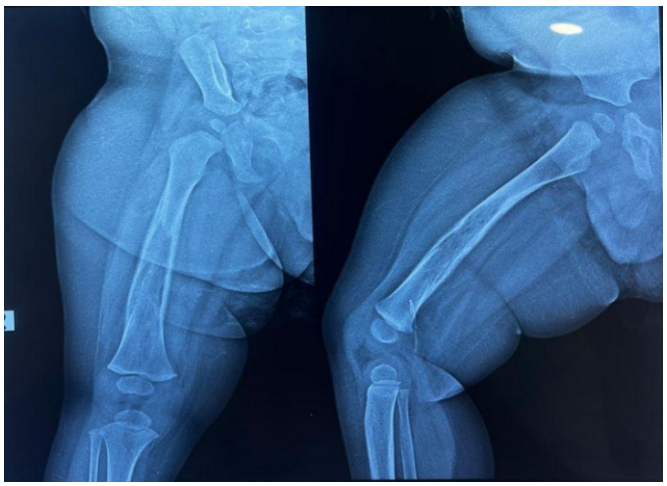

**Figure 1:** Pre-operative X-ray - Diaphyseal lytic lesion with cortical thickening and periosteal reaction.

The skeleton is the most commonly affected site in pediatric LCH, with bone lesions occurring in up to 80% of cases.[3] A solitary bone lesion, historically referred to as eosinophilia granuloma, represents single-system LCH. Frequently involved bones are the skull, pelvis, ribs and long bone such as the femur. These lesions are often lytic with possible periosteal reaction, and can resemble osteomyelitis or primary malignant bone tumors on imaging [4,5].

The purpose of reporting this article is to discuss the importance of integrating clinical, radiological and morphological features in the diagnosis of LCH. Management and prognosis of LCH are based on the clinical presentation of the lesion.

## Case Report

A 8 months well-nourished boy was brought to our hospital with refusal to bear weight on his right leg for 1 week. There was no history of trauma, fever, or weight loss.

General physical examination was normal. Local examination revealed mild tenderness over the swelling on the right thigh. The distal neurovascular status of the limb was intact.

Hematological investigations showed a white blood cell count of 20810 cells/cumm and C-reactive protein level of 20.7 mg/dL; these values suggestive of acute osteomyelitis.

X-ray of the right femur revealed punched out lytic lesion with periosteal reaction over the shaft region, features suggestive of an aggressive bone lesion (Fig. 1).

Magnetic resonance imaging of the right femur revealed cortical thickening, focal cortical defect, periosteal reaction and surrounding fluid collection suggestive of osteomyelitis (Fig. 2).

Radiologically, osteomyelitis was given as a possibility, with all investigation clinical diagnosis of osteomyelitis was made.

The patient was taken for incision and drainage and curettage of lesion. Intraoperatively, under C-arm guidance lytic lesion identified and curettage done, serous discharge was observed and slough tissue along curetted material from the femur canal sent for histopathology (Fig. 3 and 4).

The specimen revealed a proliferation of sheets of large mononuclear pale staining cells with ill-defined cellular margins (histiocytes), interspersed with inflammatory cells. These histiocytes had cleaved/grooved nuclei with vesicular chromatin and small nucleoli. The inflammatory infiltrate was predominantly composed of eosinophils. These findings were histopathologically suggestive of LCH (Fig. 5). To confirm this, immunohistochemical staining was performed; the neoplastic cells were positive for S100 (Histiocytic marker) and CD1a (Langerhans cell specific marker) (Fig. 6).

Positron emission tomography computed tomography revealed no other lesions elsewhere. Based on the age of the patient, clinical presentation of the lesion, involving a single bone uni system unifocal type of LCH was made (Fig. 7).

The patient was started on systemic chemotherapy by pediatric hematologist for a period of 6 months. Clinical and radiological outcome was observed at 6 weeks, 3 months, 6 months, 9 months of duration. Patient is doing well without progression of disease (Fig. 8 and 9).

## Discussion

LCH is currently regarded as a myeloid/histiocytic neoplasm, with a remarkably broad clinical spectrum, ranging from

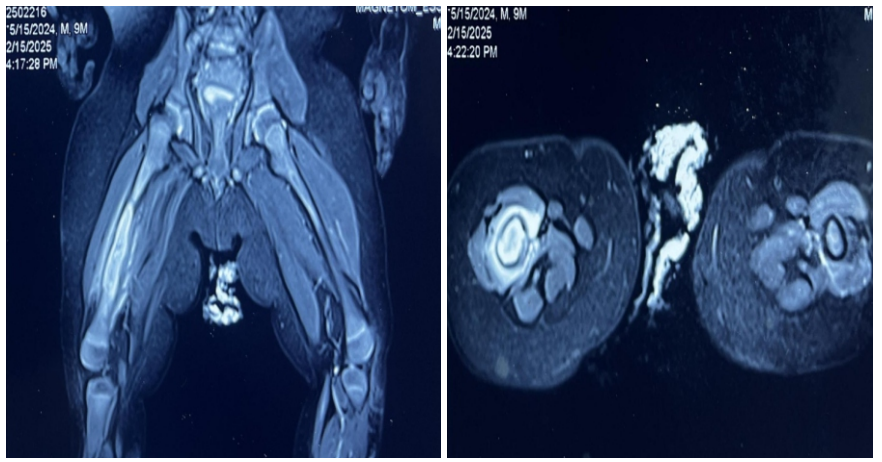


**Figure 2:** Magnetic resonance imaging – cortical thickening with focal cortical defect, periosteal reaction with surrounding fluid collection T2 cuts – Coronal image and Axial image.

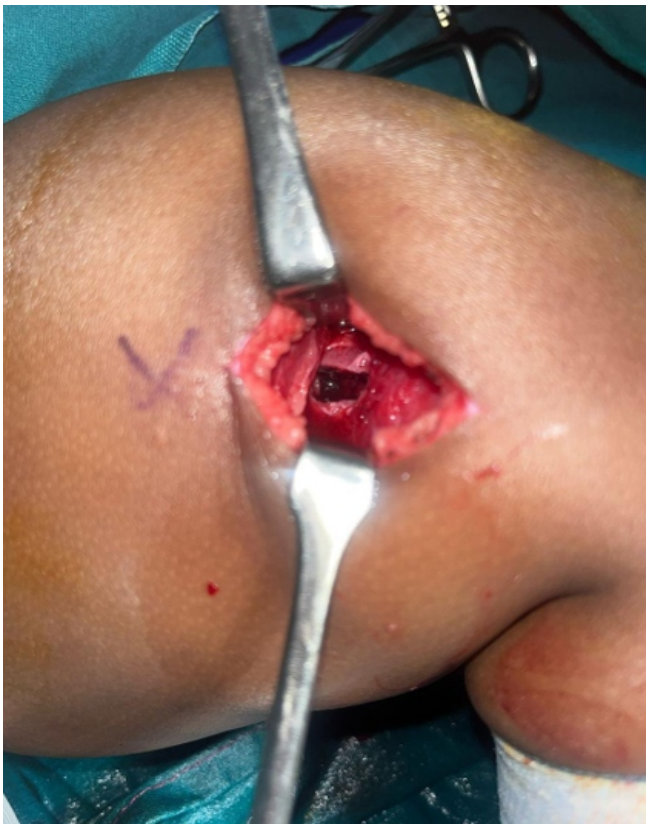

**Figure 3:** Intraoperative image – window made through cortical defect, curettage and thorough washout given.

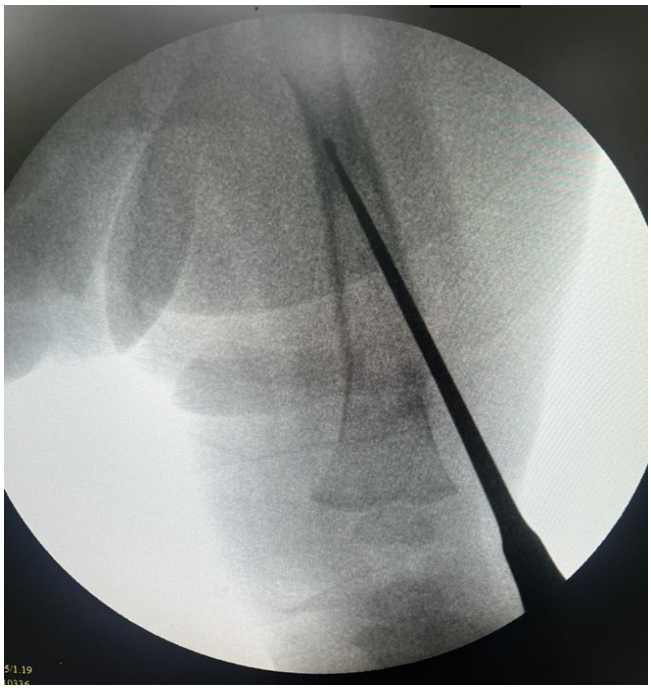

**Figure 4:** C-arm guidance femur canal curettage done.

isolated skin or bone lesions to a disseminated disease that can involve nearly any organ. LCH is generally regarded as a sporadic disease that occurs predominantly in the pediatric population [6].

The reported incidence of LCH ranges from 2.6 to 8.9 cases/million children younger than 15 years/year, with a median age at diagnosis of 3 years [7]. Our case was an infant of 8 months age. The exact incidence of LCH in adults is much less defined: The only available data are for disseminated disease, with 0.07 cases/million/year [7,8].

This distinct group of disease that is collectively referred as LCH is categorized into three variants based on the age and clinical presentation; clear separation is difficult on the basis of histological manifestations. These variants include (1) acute disseminated form with multiple system involvement often occurring mainly in infants (Letterer-Siwe disease). (2) Chronic disseminated form with osseous lesions, which are frequently multiple and with extraskeletal lesions (Hand-Schuller-Christian disease). (3) Chronic localized form with solitary or multiple skeletal lesions and occasionally extraskeletal involvement, mainly seen in adult (Eosinophilic granuloma). Hashimoto Pritzker syndrome is a congenital form of LCH presenting with a deep subcutaneous skin lesions [8,9]. In recent times, all these terminologies have become absolete and have been replaced by unisystem disease or multisystem disease. Our child presented with isolated bone disease, and extensive radiological workup did not reveal any other lesion.[10,11]

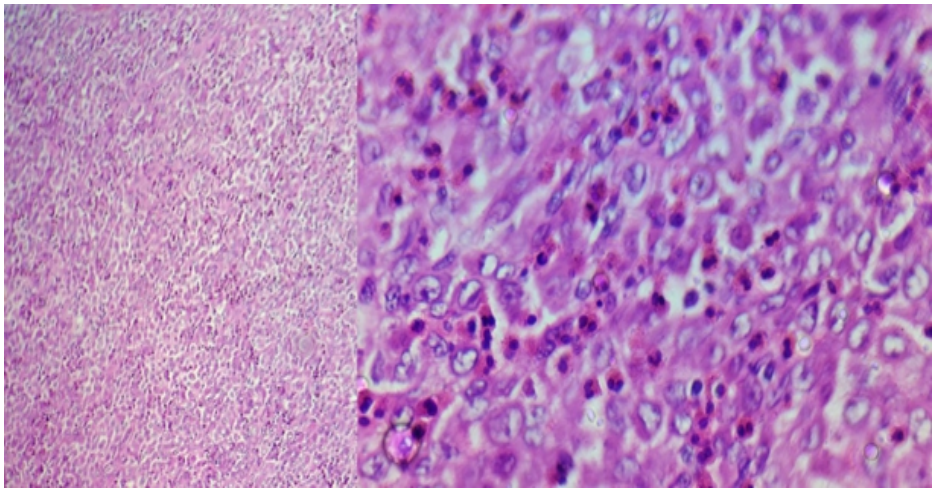

**Figure 5:** (a) Sheets of histiocytes and chronic inflammatory infiltrate hematoxylin and eosin (H&E), ×100. (b) Shows sheets of Langerhans cells with grooved/cleaved coffee bean nuclei admixed with numerous eosinophils H&E, ×400.

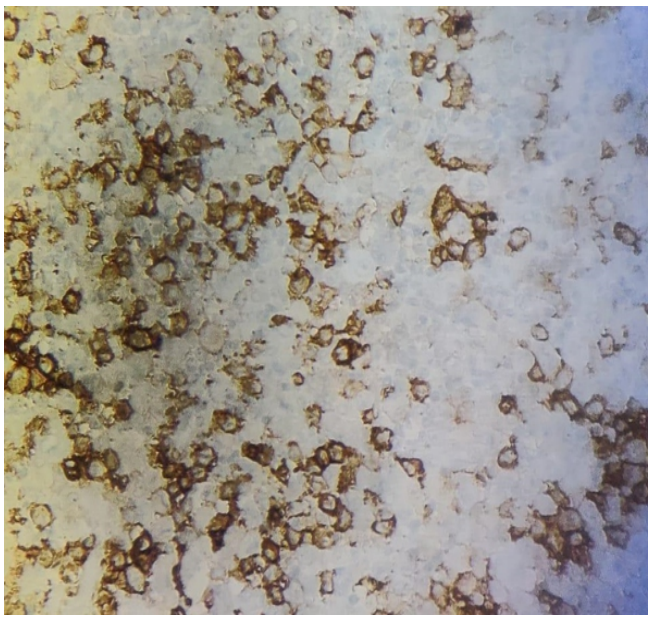

**Figure 6:** Langerin immunohistochemistry section shows large histiocytic cells with positive membranous staining for Cd1a.

In all age groups, isolated diaphyseal destruction of the long bone with fusiform periosteal reaction and extensive peripheral edema, vertebra plana of the spine, and bevelled edge of skull defects accompanied by soft tissue masses strongly suggest LCH diagnosis. Moreover, the multiple bone osteolytic destruction in children and adolescents strongly suggests LCH diagnosis [12].

There are 2 main broad theories about its pathogenesis: one, that it is a reactive process due to inappropriate immune stimulation, and the other, that it is a neoplastic disorder. In 2010, Badalian-Very et al. described abnormal CD1a+CD207+histiocytes that carried a somatic variant of the BRAFV600E oncogene in 57% of 61 affected patients. This variant has been confirmed in numerous cohorts, such as a pediatric case series in France that included 315 patients, with detection of BRAFV600E in 54.6%. Other activating pathogenic variants have been found in the RAS-RAF-MEK-ERK pathway involved in the proliferation, survival, differentiation and activation of myeloid dendritic cell precursors [13].

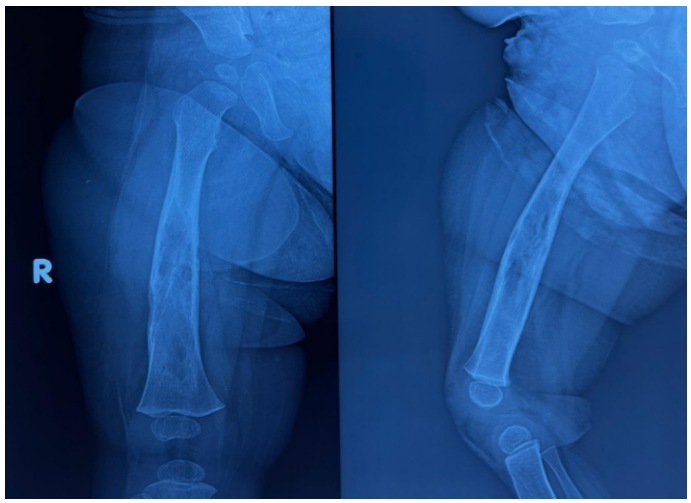


**Figure 8:** 6 weeks post-operative X-ray.

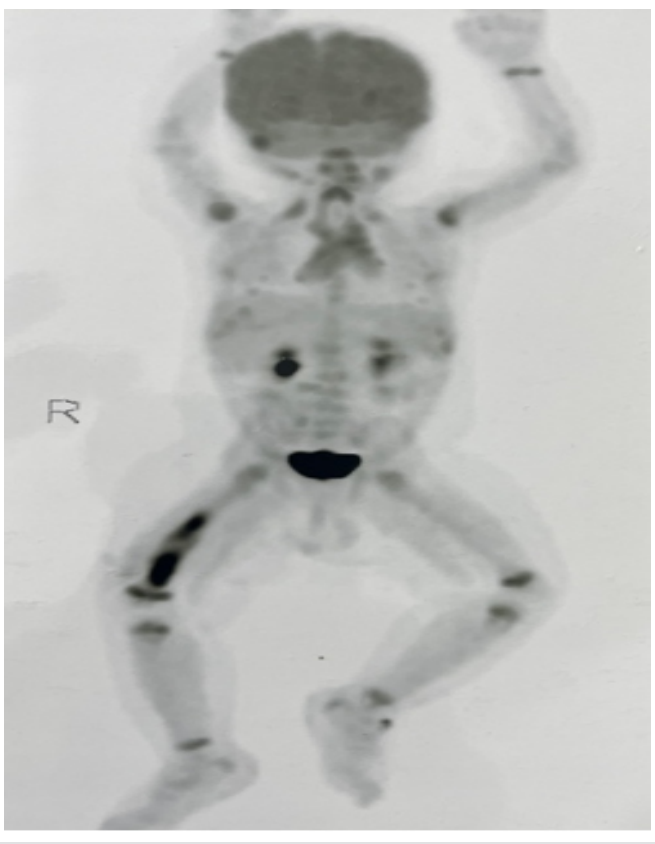


**Figure 7:** Positron emission tomography computed tomography – shows no other systemic involvement.

A definitive diagnosis of LCH requires a combination of clinical presentation, histology, and immunohistochemistry. The inflammatory infiltrate contains various proportions of LCH cells, the disease hallmark, which is round and have characteristic "coffee-bean" cleaved nuclei and eosinophilic cytoplasm. Although a well-defined histologically characteristic appearance of the LCH lesions on hematoxylin and eosin-stained sections is present, positive CD1a and/or CD207 (Langerin) staining of the lesional cells is required for a definitive diagnosis [13,14].

The preferred first-line therapy for multisystem LCH is the vinblastine - prednisone regimen. We treated our patient using Vinblastine and methyl prednisone regimen for 6 months. Methotrexate and hydroxyurea have been investigated as low-toxicity oral alternatives in LCH. BRAF inhibitors such as vemurafenib demonstrated a 41% overall response rate in

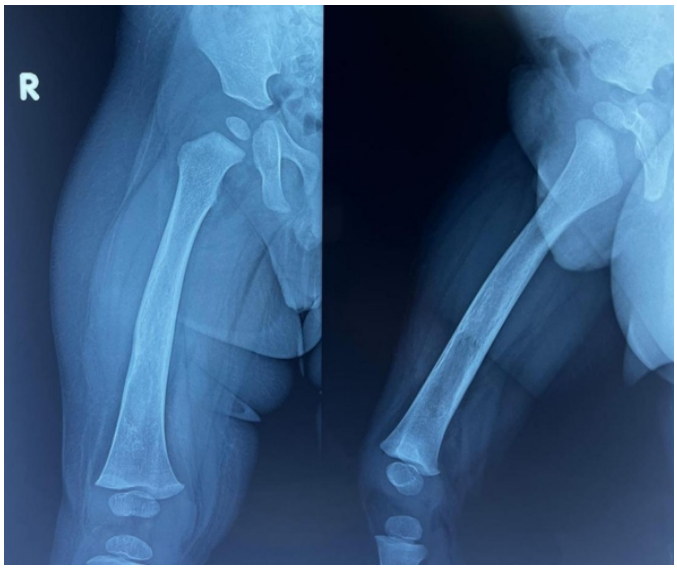


**Figure 9:** 6 months post-operative X-ray.

refractory cases [14].

## Conclusion

LCH is a rare disease with a variable presentation, which can make the diagnosis challenging. Unifocal single-system bone LCH in infants should remain a key differential consideration for lytic bone lesions that mimic infection or malignancy. In this case, prompt histological confirmation during the initial procedure enabled accurate diagnosis and appropriate management. With proper follow-up and treatment unisystem unifocal disease has good prognosis as compared to multisystem disease. We have reported single-system diaphyseal LCH in infants femur not yet published in Indian literature.

### Clinical Message

This case highlights the importance of biopsy for diagnosing bone lesions in infants, as unifocal LCH can mimic osteomyelitis or malignancy. This experience illustrates the importance of keeping a less common diagnosis as a differential diagnosis.

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

**Conflict of interest:** Nil **Source of support:** None

## References

1. Allen CE, Merad M, McClain KL. Langerhans-cell histiocytosis. N Engl J Med 2018;379:856-68.

2. Feng S, Han L, Yue M, Zhong D, Cao J, Guo Y, et al. Frequency detection of BRAF V600E mutation in a cohort of pediatric langerhans cell histiocytosis patients by next-generation sequencing. Orphanet J Rare Dis 2021;16:272.

3. Chang WF, Hsu YC, Wu YD, Kuo CL, Huang GS. Localized Langerhans cell histiocytosis masquerading as Brodie's abscess in a 2-year-old child: A case report. EXCLI J 2016;15:33.

4. El Demellawy D, Young JL, De Nanassy J, Chernetsova E, Nasr A. Langerhans cell histiocytosis: A comprehensive review. Pathology 2015; 47:294-301.

5. Stålemark H, Laurencikas E, Karis J, Gavhed D, Fadeel B, Henter JI. Incidence of Langerhans cell histiocytosis in children: A population-based study. Pediatr Blood Cancer 2008;51:76-81.

6. Baumgartner I, Von Hochstetter AR, Baumert BG, Luetolf UM, Follath F. Langerhans cell histiocytosis in adults. Med Pediatr Oncol 1997;28:9-14.

7. Goyal G, Shah MV, Hook CC, Wolanskyj AP, Call TG, Rech KL, et al. Adult disseminated Langerhans cell histiocytosis: Incidence, racial disparities and long-term outcomes. Br J Haematol 2018;182:579-81.

8. Yashoda-Devi B, Rakesh N, Agarwal M. Langerhans cell histiocytosis with oral manifestations: A rare and unusual case report. J Clin Exp Dent 2012;4:e252-5.

9. Aruna DR, Pushpalatha G, Galgali S, Prashanthy. Langerhans cell histiocytosis. J Indian Soc Periodontol 2011;15:276-9.

10. Zhao M, Tang L, Sun S, Cui J, Chen H. Radiologic findings that aid in the reduction of misdiagnoses of Langerhans cell histiocytosis of the bone: A retrospective study. World J Surg Oncol 2021;19:146.

11. Astigarraga I, García-Obregón S, Pérez-Martínez A, Gutiérrez-Carrasco I, Santa-María V, Rodríguez-Vigil Iturrate C, et al. Histiocitosis de células de Langerhans. Avances en la

patogenia y práctica clínica. An Pediatr (Barc) 2022;97:130.e1-7.

12. Krooks J, Minkov M, Weatherall AG. Langerhans cell histiocytosis in children: Diagnosis, differential diagnosis, treatment, sequelae, and standardized follow-up. J Am Acad Dermatol 2018;78:1047-56.

13. Haupt R, Minkov M, Astigarraga I, Schäfer E, Nanduri V, Jubran R, et al. Langerhans cell histiocytosis (LCH): Guidelines for diagnosis, clinical work-up, and treatment for patients till the age of 18 years. Pediatr Blood Cancer 2013;60:175-84.

14. Hamoud M, Alchaikh Hassan R, Dasanu CA. Selecting optimal therapy for Langerhans cell histiocytosis: Current state and future directions. Expert Opin Pharmacother 2025;26:1005-8.

**Acknowledgement:** We thanking paediatric team and Pathology team for Helping in diagnosis and management of disease.

**Conflict of Interest:** Nil
**Source of Support:** Nil

**Consent:** The authors confirm that informed consent was obtained from the patient for publication of this article

**How to Cite this Article**

Sathish K, Shenbagavalli T, Chockalingam S, Ramasamy PR. Solitary Diaphyseal Langerhans Cell Histiocytosis of Femur in an Infant – A Case Report. Journal of Orthopaedic Case Reports 2026 May;16(05): 199-204