CASE REPORT

Paediatric Langerhans cell histiocytosis with diabetes insipidus: remarkable recovery journey

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Abstract

A rare condition known as Langerhans cell histiocytosis (LCH) is characterised by the clonal growth of dendritic cells called Langerhans cells, which play a significant role in the immune system. A diverse range of clinical presentations are probable as a result of this condition's ability to develop in different systems of the body. LCH presents with variable clinical manifestations, demonstrated by a range from specific multisystem involvement to more extensive bone abnormalities. This case report details the clinical course of a four-year-old male who presented with rash on the scalp and multiple lumps on the head for the past three months and a history of polyuria for two months. The findings were indicative of Langerhans cell histiocytosis after clinical and histological investigative studies. Moreover, endocrinological investigations demonstrated the development of central diabetes insipidus, as a complication.

Keywords: Langerhans cell histiocytosis, Central diabetes insipidus, Polyuria, Multidisciplinary care, Chemotherapy.

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Introduction

Langerhans Cell Histiocytosis (LCH) and Diabetes Insipidus (DI) are uncommon medical disorders, presenting a challenging therapeutic situation, notably in paediatric cases. Diabetes insipidus results from the kidneys' inability to regulate water balance, leading to excessive urination and thirst. Langerhans cell histiocytosis involves the accumulation of immune cells called Langerhans cells in various tissues, potentially affecting multiple organs.

The unique complexities arising from their developing physiology complicate the diagnosis and treatment in juvenile patients. This case report, being shared after institutional Ethical approval, underscores the importance of early identification, precise diagnosis, and comprehensive therapy in a paediatric patient with concurrent DI and LCH.

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Case Presentation

A four-year-old boy, weighing 10kg sought medical attention at the Outpatient Department (OPD) on June 7, 2022 at National Institute of Child Health Karachi, due to a collection of symptoms troubling him over the past few months. This case is being shared after taking consent from the child's parents. His caregivers reported a persistent rash on his scalp resembling seborrheic rash for about three months. Additionally, they noticed several lumps on his head that had been present for around two months. Furthermore, the child had been experiencing excessive urination for approximately two months, with documented polyuria at a rate of 1600 ml/day, which is equivalent to 6.6 ml/kg/hr.

The patient had a noteworthy medical history, including a previous hospitalisation in Larkana due to fever and pallor. During that admission, he was treated for severe anaemia and received multiple packed cell volume (PCV) transfusions at haemoglobin level of 5.4gm/dl. His birth history indicated an uncomplicated vaginal delivery. Family history revealed consanguinity, with one stillbirth in the family but no reported chronic illnesses among close relatives.

Upon physical examination, the child exhibited multiple swellings on his head and a seborrheic rash on the scalp, post-auricular region, and neck, along with ear discharge as shown in (Figure 1) Anthropometric measurements indicated growth below the fifth centile, with clinical findings of pallor and, notably, cervical lymphadenopathy. Another swelling on the left side was associated with mechanical ptosis of the left eyelid, yet no visual impairment was detected. Abdominal examination showed liver of 4cm below the right costal margin and spleen of 3cm in its long axis, firm in consistency.

Lab results indicated normocytic anaemia and elevated ferritin. A skeletal survey showed punched-out lytic lesions on the frontal and parietal bones (Figure 2). A

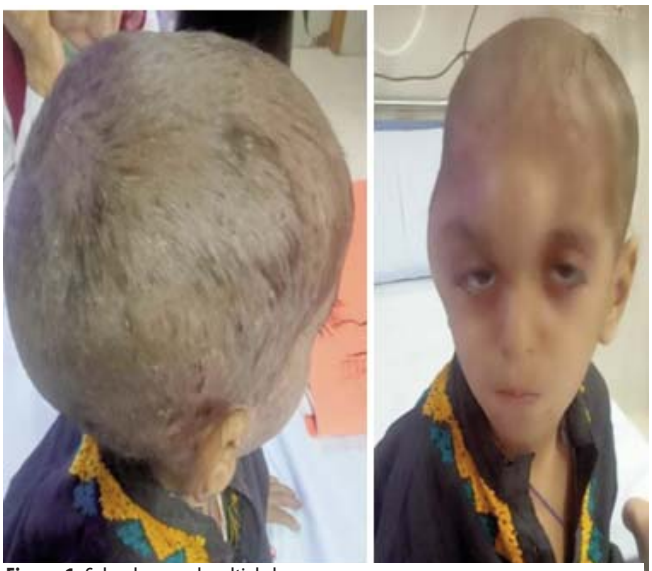

Figure-1: Seborrhoea and multiple bumps.

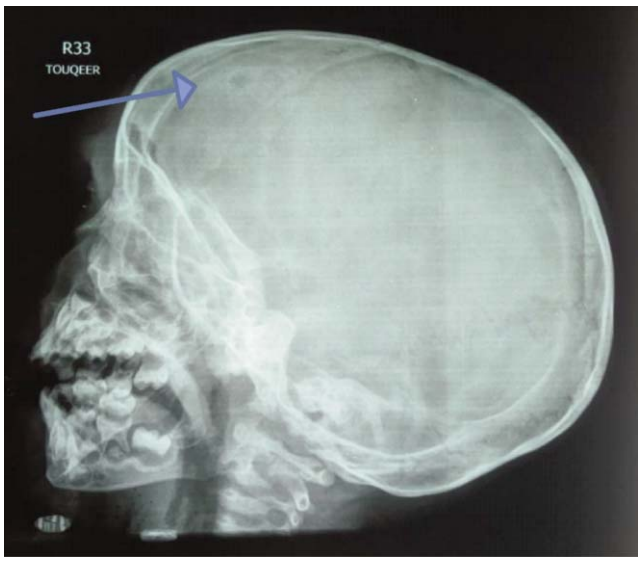

Figure-2: Classical Lytic lesions

Table: Water deprivation test with protocol indicating central DI

WATER DEPRIVATION TEST
STEP 1: BASELINE PLASMA AND URINE OSMOLALITY
Serum = 287.3 mOsm/kg
Urine = 127.3 mOsm/kg
STEP 2: Water deprivation for six hours (hourly weight and vitals and urine output measurement
Serum = 298 mOsm/kg
Urine = 232 mOsm/kg
STEP 3: Desmopressin nasal spray (Minrin 10ug/dose) 2 nasal puff administered
Serum = 272 mOsm/kg
Urine = 372 mOsm/kg
INTERPRETATION
Central Diabetes Insipidus (normal urine osmolarity should be >750)

water deprivation test confirmed central diabetes insipidus (Table 1). Thyroid function and other lab values remained normal.

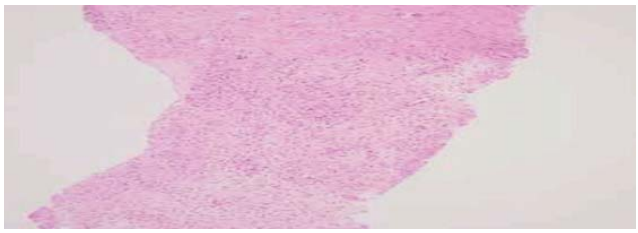

Figure-3: Classical histiocytes seen.

Histopathological examination confirmed Langerhans cell histiocytosis (LCH) with positive immunotoxins (Figure 3). The lesion exhibited cells with abundant cytoplasm, elongated nuclei, and prominent nuclear grooves, with a background of macrophages and eosinophils expressing:

- S-100+
- CD-1a+

The diagnosis was LCH with CDI. Treatment commenced with chemotherapy and other measures, resulting in observed improvements in scalp rash and swelling size. Follow-up involved monitoring treatment response and disease progression.

The treatment plan included vinblastine, prednisone, and desmopressin. Subsequently, improvements were observed in scalp rash and swelling size (Figure 4). Follow-up involved monitoring urine and serum osmolality for

Figure-4: Picture after treatment.

treatment response and disease progression.

Discussion

The co-occurrence of Langerhans cell histiocytosis (LCH) and diabetes insipidus (DI) in children highlights the challenges of treating rare but related diseases.[1] The clinical presentation, including hepatosplenomegaly, increased thirst, polyuria, and skin lesions, raised concerns about an underlying disease, further complicated by the presence of both LCH and DI.[2,3] Differentiating between primary DI and DI with LCH involvement presented diagnostic challenges that emphasised the importance of careful analysis and awareness of possible interactions between the various conditions.[3]

Diagnoses of both DI and LCH require thorough diagnostic work-ups that include laboratory tests and imaging scans. Of particular importance was the detection of bone lesions and pituitary abnormalities associated with LCH using imaging techniques. Even in the absence of overt endocrine symptoms, investigation of the hypothalamic-pituitary axis was necessary in LCH cases because of the identified pituitary involvement.[4,5]

Treatment included chemotherapy for LCH and HRT in DI. The effectiveness of hormone replacement therapy in managing DI symptoms underscores the importance of prompt intervention to restore fluid balance and mitigate complications. In addition, tailored chemotherapy emphasised the importance of multidisciplinary care, with paediatric endocrinologists, haematologists, and oncologists working closely together to achieve successful outcomes.[6,7]

Although the patient responded positively to treatment, issues such as compliance, potential side effects of chemotherapy, and long-term follow-up persisted. Continued follow-up care was essential to ensure continued improvement and early detection of potential relapses or adverse outcomes.

This case highlights the value of a multidisciplinary approach in the management of complex scenarios involving rare comorbidities. It also highlights the importance of healthcare providers being alert to possible associations between seemingly disparate symptoms. In addition, it raises questions about how the micro-environment and immunological disorders influence the co-occurrence of DI and LCH.

Although our findings help to understand the clinical presentations, diagnostic strategies and therapeutic interventions in such cases, further studies are needed to clarify the relationship between LCH and DI. This will help refine treatment strategies based on a deeper understanding of these interactions.

Finally, this case report provides valuable information on the management of these conditions. But more research is needed to improve understanding and treatment.

Conclusion

The case study emphasises the importance of recognising the multifarious clinical appearances linked to LCH. It also emphasises the importance of thorough study and management of the complex problems skilfully to improve outcome.

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Conflict of Interest: None.

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Authors' Contribution:
VRR: Writing.
ZB: Compiling writing.
RP: Literature review.
MN: Literature review and discussion.
HR: Drafting and literature review.