Case Report

Langerhans cell histiocytosis of the left tibia bone: A case report

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ABSTRACT

Langerhans cell histiocytosis (LCH) is a rare group of disorders including single lesion to widespread disseminated disease. The incidence of this disorder is around 5–6 cases per million children per year with more than 50% of cases are diagnosed between 1 and 15 years old and peaks between 1 and 4 years old. This case report describes a rare case of a 2-year-old boy patient with a single lesion LCH in the left tibia. The diagnosis was challenging as the presenting symptom was not specific and the radiograph examination mimicked osteomyelitis. The diagnosis was then confirmed with immunohistochemistry (IHC) S-100 staining. The patient had a surgical curettage, application of bone graft and plate, and screw fixation. At 9 months follow-up, the patient was able to walk without gait disturbance and there was no new lesion reported. This case report pointed out that in the diagnosis of LCH, physical, and radiological examination mimicked other more common diseases and IHC S-100 staining had confirmed the diagnosis of LCH. It also showed that for a small single lesion of LCH, minimal intervention leads to a good outcome.

Key words: Bone lesion, Dendritic cell, Langerhans cell histiocytosis, S-100

Langerhans cell histiocytosis (LCH) is a rare group of disorders with a wide spectrum of clinical presentations. Cellularly, LCH is characterized by aberrant function and differentiation or proliferation of cells of the mononuclear phagocyte system resulting in an increase of macrophages in tissue [1,2]. LCH is usually diagnosed in children between 1 and 15 years old. The most common symptom found in the patient was pain which is quite common in orthopedic cases. Moreover, its diverse clinical manifestations made it challenging for this tumor to diagnose.

Here, we present the case of LCH in a 2-year-old boy. This case report presents a patient with proximal tibia destruction caused by LCH that was treated by tumor resection, open reduction and internal fixation, and bone graft. The steps of diagnosis were described and the patient was followed up until months after the surgical treatment.

CASE REPORT

A 2-year-old male was brought to the hospital with complaints of apparent limp walking and swelling below the left knee (Fig. 1). The patient was easily exhausted after normal walking and relieved by rest. The patient reported no history of trauma, loss of body weight, loss of appetite, chronic cough, chronic fever, steroid use, tumor, and operation. However, there was a family history of brainstem tumor in the patient's grandmother since 10 years ago.

On physical examination, the patient was well-nourished and vital signs were normal. Abnormalities were found on the local examination of the left leg, there was slight swelling and the skin was relatively warmer around the mass, and tender in comparison to the normal side. The mass was hard and immobile with the size of 4 × 3 cm and an undefined border. There was no neurovascular disturbance. The range of motion of the knee, hip, and ankle were full. Karnofsky Performance Status Scale was 90%.

A week later, X-ray examination revealed a picture indicating primary bone tumor or osteomyelitis (Fig. 2). The lump had no improvement and magnetic resonance imaging (MRI) was performed. On MRI, there were changes in the intensity of the proximal one-third of the left tibia diaphysis bone marrow with variations in the periosteal reaction and thickening of the periosteum which at T1WI appears hypointense to hyperintense at T2WI, and T2 short tau inversion recovery (STIR) with increased contrast in the medulla, cortex, and periosteum, as well as thickening of the periosteum. It was hypointense on T1WI, hyperintense at T2WI, and T2 STIR with increased contrast in the medulla, cortex, and periosteum, as well as bone marrow thickening. Destruction of the left tibia bone cortex and collection of soft tissue fluid on the medioanterior side of the left tibia bone suggest osteomyelitis in the proximal one-third of the tibia bone (Fig. 3).

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From a biopsy, we found connective tissue fragments with dense histiocytes, eosinophil, lymphocyte, polymorphonuclear leucocyte, plasma cell, and multinucleated giant cell. The feature indicated LCH and should be confirmed with immunohistochemistry (IHC) S-100 staining. From IHC S-100 staining, the diagnosis of LCH of this patient was confirmed. Three weeks later, the patient had a surgical procedure of tumor curettage and followed with bone internal fixation using plate and screws. Bone graft was also applied to stimulate bone healing (Fig. 4).

The patient showed with favorable outcome at 9 months follow-up, there was no new lesion, and the patient was able to walk normally. There was no pain and no signs or symptoms of recurrence were reported. A plain radiograph showed no recurrence (Fig. 5).

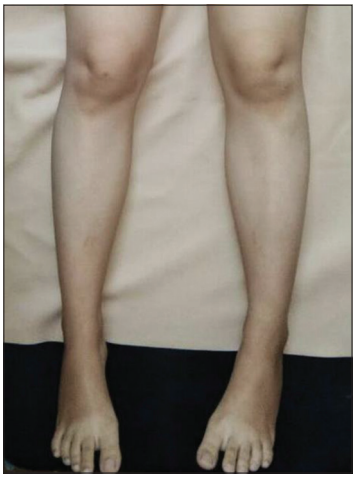

Figure 1: Clinical photograph of the left and right cruris region

DISCUSSION

LCH is a rare group of disorders with a spectrum of clinical presentations ranging from a single bone lesion or trivial skin rash to an explosive disseminated disease [1,2]. Although having wide range of clinical manifestations, LCH lesions share the common histology of abnormal proliferation of immature CD1a1/CD2071 dendritic cells [2]. The incidence of this disorder is around 5–6 cases per million children per year with more than 50% of cases are diagnosed between 1 and 15 years and peaks between 1 and 4 years [1,3].

The etiology of this entity is still unknown, with conflicting reports between its neoplastic origin and the possibility of a reactive immune condition. Recent findings of a mutation in

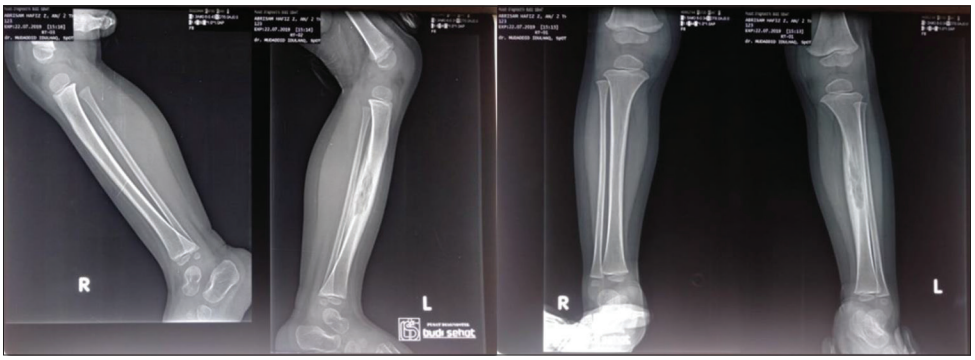

Figure 2: X-ray of cruris regio showing periosteal reaction and thickening of the periosteum

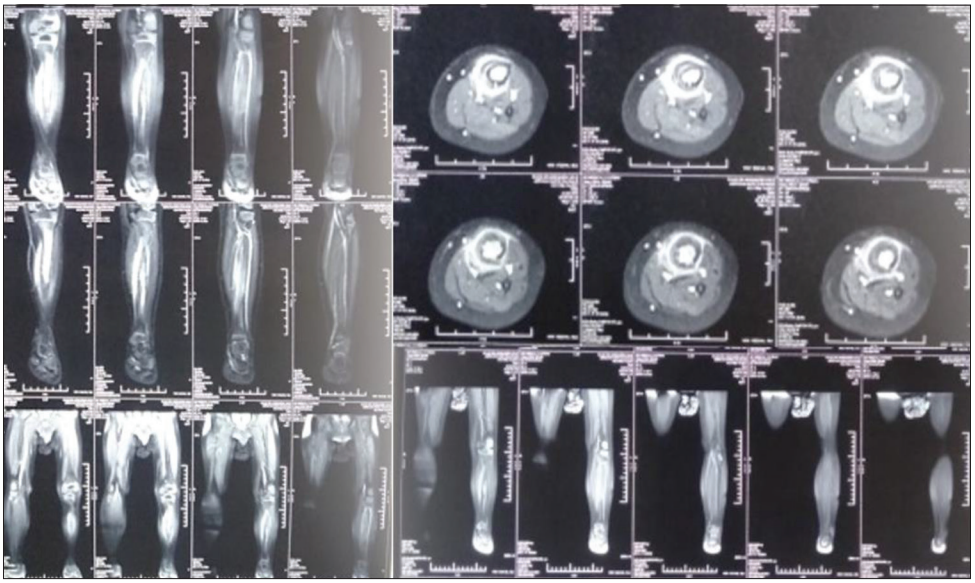

Figure 3: On magnetic resonance imaging, T1WI appears hypointense to hyperintense at T2WI, and T2 short tau inversion recovery with increased contrast in the medulla, cortex, and periosteum

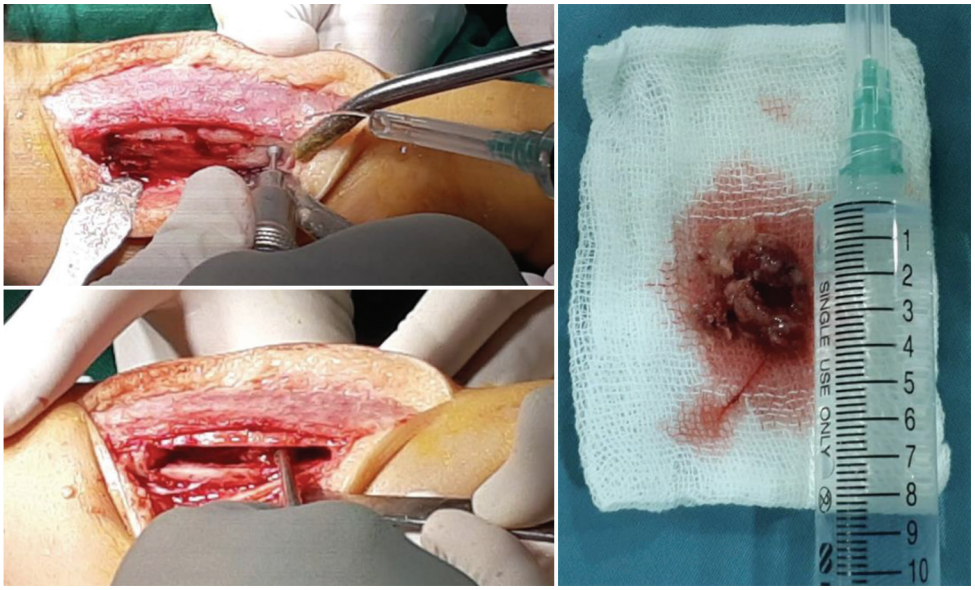

Figure 4: Left: Tumor resection and curettage was done. Right: Size of the tumor is shown in comparison to 10 ml spuit

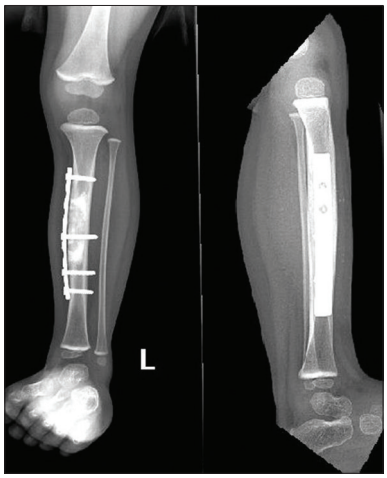

Figure 5: X-ray post-operative at 9 months follow-up showing no new lesion and good recovery of the bone

BRAF and MAP2K1 have led to the assumption of its neoplastic origin, at least in some subgroups [4,5].

The most common symptom at onset is local pain and this was found in 50–90% of patients with bone lesions [6]. In our patient, the pain was present which worsen particularly at night. Other clinical manifestations described are swelling, which was also present in our patient. Since LCH may affect any organ or system of the body, the condition should be considered, whenever suggestive clinical manifestations occur in the skin, bone, lung, liver, or central nervous system. LCH that involves skin may appear as vesicles or bullae, dermatitis, nodules, pruritus, and petechiae. Jaundice, diabetes insipidus, and hypoalbuminemia are other manifestations of LCH. LCH that involves long bones may have a lytic lesion that mimics osteogenic sarcoma, Ewing's sarcoma, fibrous dysplasia, septic osteomyelitis, and chronic recurrent multifocal osteomyelitis. This explains the clinical manifestation in our patient who was at first diagnosed with osteomyelitis [7].

LCH is a challenging diagnosis due to the spectrum of clinical manifestations that overlap with more common conditions. An important test for diagnosis is biopsy with characteristic histiocytes with surface expression of CD207 (langerin) and CD1a [2]. Significant changes in circulating and lesional receptor activator of nuclear factor kappa-B ligand (RANKL) levels have been observed in LCH patients irrespective of bone involvement since receptor activator of nuclear factor kappa-B, RANKL, and osteoprotegerin not only regulates bone homeostasis through its effects on the osteoclasts but also affects the activation and survival of immune cells [7]. MRI is the most suited mean for delineating marrow extent and soft-tissue involvement in LCH of the bone. Some authors suggested that whole-body MRI is more useful and significant than conventional radiography and scintigraphy in not only locating more skeletal lesions but in identifying extraskeletal lesions also. MRI findings in LCH of the bone are non-specific. A focal lesion with extensive soft tissue and marrow edema is most commonly found as hypointense areas in T1W images and hyperintense areas on T2W and STIR images. The peritumoral edema is less extensive than that of Ewing's sarcoma and osteomyelitis, the two most common differentials of LCH [8-10].

The treatment varies from observation only to surgery, chemotherapy, radiotherapy, or combination depending on the localization and the spread of the disease. For a single bone lesion, observation-only, injection of methylprednisolone, or curettage can be performed. Since small lesion LCH may undergo spontaneous healing, it is essential to limit the invasiveness of the treatment. For the involvement of weight-bearing bone, like in this patient, additional treatment of fixation can be performed and lead to good outcomes with no recurrency [3,11].

LCH in its most classical form has sheets of cytoplasm-rich pale histiocyte interspersed with inflammatory cells, eosinophils, and lymphocytes. The nuclear morphology of LCH is typical and consists of monocytoid, grooved, and complexly folded form in a pale-staining cytoplasm. Giant cells can be found in several types. Around bone lesions, osteoclast-type giant cells are most

common. Eosinophils can be abundant, forming eosinophilic micro-abscesses. LCH cells express CD1a, S100 protein, and CD207 (langerin, a protein associated with Birbeck granule formation). S100 protein is a well-known marker for LCH [11-13].

CONCLUSION

We present the case of a 2-year-old boy with LCH that had a surgical curettage, application of bone graft and plate, and screws fixation. Nine months following surgery, the patient showed good outcomes and was able to walk without gait disturbance and there was no new lesion reported. This case report pointed out that in the diagnosis of LCH, general, physical, and radiological examination mimicked other more common diseases and IHC S-100 staining had confirmed the diagnosis of LCH. It also showed that for a small single lesion of LCH, minimal intervention leads to a good outcome.

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