Langerhans cell histiocytosis of atlantoaxial joint in a middle-aged man presenting with deafness as first symptom and soft-tissue mass at neck showing excellent response to radiotherapy alone: Report of an extremely rare and unusual clinical condition and review of literature

Dodul Mondal, P. K. Julka, Manisha Jana[1], Ritika Walia[2], Tamojit Chaudhuri[3]

Departments of Radiation Oncology, [1]Radiodiagnosis, and [2]Pathology, DRBRAIRCH, All India Institute of Medical Sciences, New Delhi, [3]Department of Radiation Oncology, SGPGIMS, Lucknow, India

Abstract

Langerhans cell histiocytosis (LCH) is a disorder of clonal proliferation of dendritic cell mainly occurring in children. Spine involvement is rare. This usually presents with pain and torticollis when neck is involved. Histopathology with immunohistochemistry is confirmatory. Local curative therapy with excision or curettage is used for localized disease. Radiotherapy is usually reserved for selected cases. Systemic chemotherapy is the treatment of choice for widespread systemic disease. In this article, we present an unusual presentation of atlantoaxial LCH with mastoid involvement resulting in hearing loss as the first symptom and quadruparesis in a middle aged male patient, which was also associated with soft-tissue mass at the nape of the neck and deafness. The patient was treated with radical radiotherapy, which provided excellent response to the disease. Involvement of atlantoaxial joint and temporal bone associated with soft-tissue mass neck and deafness in a middle-aged man is an extremely rare clinical situation.

Key Words

Atlanto-axial joint, deafness, Langerhans cell histiocytosis, male, radiotherapy

For correspondence:

Dr. Dodul Mondal, Department of Radiation Oncology, DRBRAIRCH, All India Institute of Medical Sciences, Ansari Nagar, New Delhi - 110 029, India. E-mail: dodulmondal@gmail.com

Ann Indian Acad Neurol 2014;17:429-32

Introduction

Introduction: Langerhan's cell histiocytosis is a rare disorder caused by clonal proliferation of specialized dendritic cells. Initially they were subdivided into three different entities like Eosinophilic granuloma (The solitary site localized form), Hand-Schuller Christian disease (comprising of bony lesions, exophthalmos and diabetes insipidus), and the most severe Letterer — Siwe disease (multi-system involvement). In 1997, the classification has been revised by the WHO committee on histiocytes/reticulum cell proliferations. Localized disease, previously described as 'eosinophilic granuloma' is currently defined under single system, solitary site disease. [1, 2]. Patients mostly present with pain. If it involves cervical vertebra, patients can present with torticollis. Local therapy is employed for solitary lesions and more widespread disease is managed with systemic chemotherapy.

Access this article online

Quick Response Code:

Website: www.annalsofian.org

DOI: 10.4103/0972-2327.144022

Case Report

A 44-year-old male presented to our out-patient department (OPD) with the complains of loss of hearing for 3 years and gradually progressive swelling at the nape of the neck for 1 year, and weakness of upper and lower limbs for 6 months. On clinical evaluation, a soft-tissue mass was found at the nape of the neck region involving occiput and upper cervical spine region. It was associated with mild motor weakness in all the four limbs without any sensory

involvement. There was no evidence of any seborrheic dermatitis or any visible tumor anywhere in the body. Magnetic resonance imaging (MRI) of the neck [Figure 1] showed an enhancing soft tissue mass in relation to the occipital bone and posterior arch of atlas. Non-contrast computed tomography (NCCT) scan showed lytic destruction of right temporal bone and right side of clivus, occipital bone with involvement of atlas and posterior element and dens of axis [Figure 2]. Assimilation of anterior arch was also seen. Trucut biopsy from the soft tissue mass showed [Figure 3a] fibrocollagenous tissue infiltrated with inflammatory cells and few plasma cells. There were multiple histiocytic cells including multinucleated cells showing grooves and convolutions. Immunohistochemistry showed strong immunopositivity of the histiocytes for CD1a [Figure 3b] and langerin [Figure 3c]. Overall features were suggestive of Langerhans cell histiocytosis (LCH). A full body skeletal survey did not reveal any other lesion in the body. Audiometric evaluation showed mild conductive hearing loss in the right ear.

He was treated with radical radiotherapy to a dose of 15 Gy in five fractions, one fraction/day with three-dimensional conformal radiotherapy (3DCRT) technique.

One year after treatment he is doing fine with improvement of motor power of all the four limbs. The neck swelling has completely resolved clinically. Response assessment CT scan showed resolution of the soft tissue mass in the neck [Figure 4]. However, there was no improvement of hearing loss.

Discussion

LCH is a rare disorder caused by clonal proliferation of specialized dendritic cells. Initially they were subdivided into three different entities such as eosinophilic granuloma (the solitary site localized form), Hand-Schuller Christian disease (comprising of bony lesions, exophthalmos, and diabetes insipidus), and the most severe Letterer–Siwe disease (multi-system involvement). In 1997, the classification has been revised by the WHO committee on histiocytes/reticulum cell proliferations. Localized disease, previously described as "eosinophilic granuloma" is currently defined under a single system, solitary site disease.[1,2]

The exact etiology of LCH is unclear and debatable owing to features common to both malignant transformation and dysregulation of the immune system. The lesions show the presence of Langerhans cell (LC) in association with other histiocytes like intermediate cells, other cells of dendritic lineage, eosinophil, macrophage and T-cell lymphocytes. The characteristic presence of LC, Birbeck granule under electron microscopy, CD1a and CD207 (langerin) on immunohistochemistry is characteristic of LCH and can differentiate this disorder from other dendritic cell diseases such as malignant histiocytosis, juvenile xanthogranuloma, hemophagocytic lymphohistiocytosis. Birbeck granule is a tennis racket shaped and have a bulbous and rod shaped appearance.[3]

LCH most commonly occurs in children and almost 80% occur below 10 years age group. Men are more commonly affected than women. Common site of involvement are skull (26%), vertebra (7%), ribs (12%), upper and lower jaw (9%), and bones of extremities (11%). Involvement of the spine is rare. In a series of 214 patients reported by Bunch *et al*. only 14 cases out of 214 involved spine.[4] Osseous involvement is commoner than extraosseous involvement.

Common symptoms of cervical LCH are pain, restricted range of motion or torticollis. In spinal LCH, it commonly involves vertebral bodies, thoracic spine (54%) being the most common site of involvement followed by the lumbar (35%) and cervical spine (11%). Cervical vertebral involvement is exceedingly rare. [5] Plain radiograph is the usual investigation performed, CT and MRI are occasionally performed for exact delineation of the extent of the lesions. LCH lesions in the vertebrae typically involve the vertebral body with sparing of the neural arch. Single vertebral involvement is the usual finding. Radiologically, they present with a lytic lesion with well-defined margins in the early stage. In an advanced stage, there is uniform collapse with marked reduction of the vertebral body height with maintained intervertebral disc space height (vertebra plana, silver dollar vertebra), typically found in children. Vertebral body height tends to return toward normal with healing of the lesions. However, whether vertebral height in adults also return to normal in an adult is not very clear. Contrary to the thoracic and lumbar spine involvement, the usual clinical

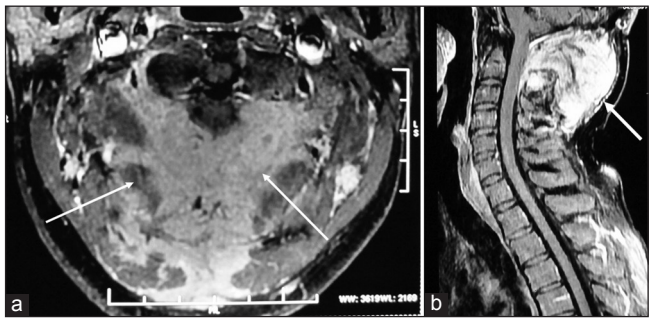

Figure 1: Axial (a) and sagittal (b) spin echo T1-weighted fat suppressed images after administration of gadolinium reveal a large enhancing soft-tissue mass involving the posterior arch of atlas and the occipital bone (arrows); and also involving the posterior neck muscles. The lesion had an intradural component at C2 level

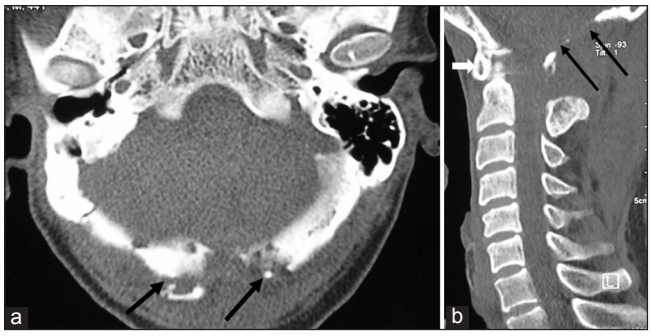

Figure 2: Axial (a) and sagittal reformatted (b) non-contrast computed tomography image of the cranio-vertebral junction and cervical spine bone window reveal the involvement of the occipital bone as lytic destruction (arrows) and involvement of the petrous and mastoid temporal visualized as bony sclerosis. Also note the assimilation of anterior arch of atlas (block arrow)

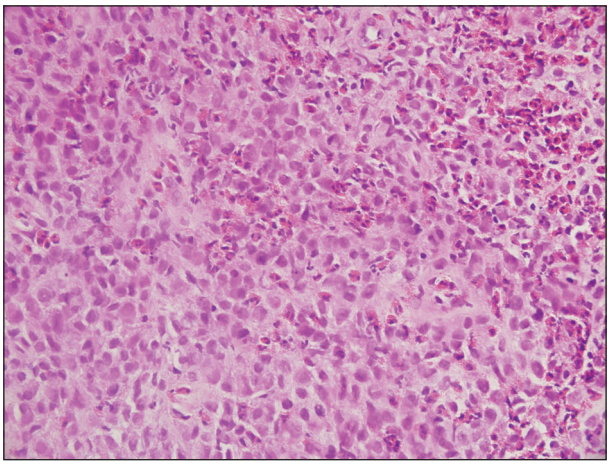

Figure 3a: Sheets of histiocytic cells along with an infiltration of eosinophils and plasma cell (H and E, ×400)

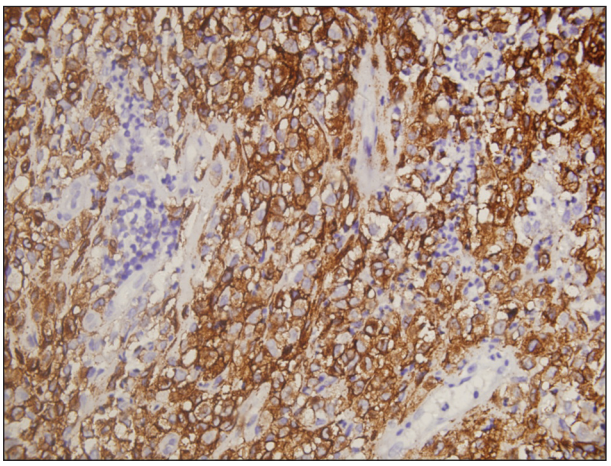

Figure 3b: Histiocytic cells immunopositive for CD1a

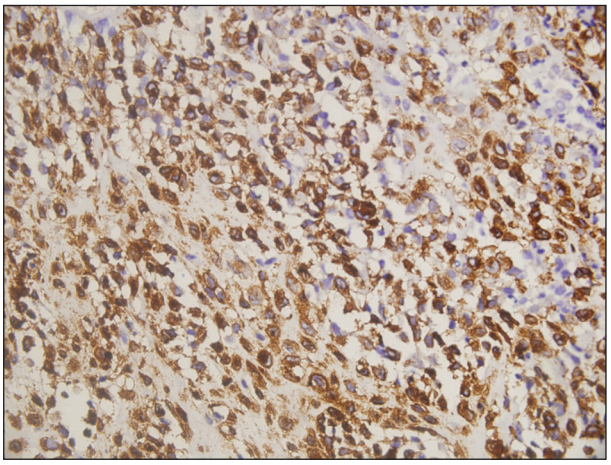

Figure 3c: Histiocytic cells immunopositive for langerin

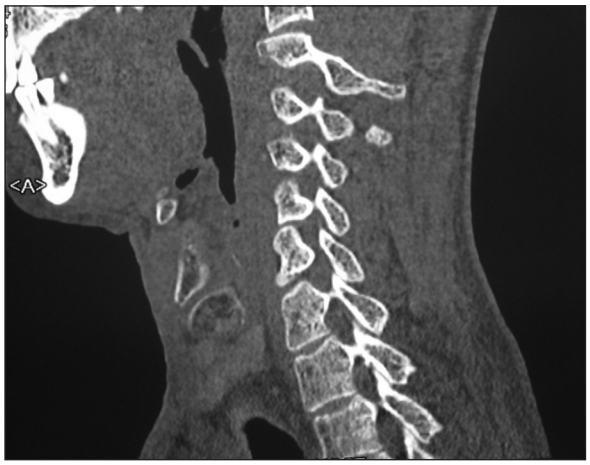

Figure 4: Sagittal reformatted non-contrast computed tomography image on follow-up reveals a reduction in the soft-tissue component

presentation in cervical spine LCH is pain and restriction of neck movement.[6] The site of involvement varies in adults and children; the middle cervical vertebrae being commonly involved in children and the axis in adults.[6] Vertebra plana, which is a common radiological finding in thoracic spine LCH, is infrequent in cervical spine involvement.[6] The usual radiologic manifestation is an ill-defined osteolytic lesion. CT and MRI are uncommonly performed, but useful for delineation of the extent of bony destruction and soft-tissue extension. Another advantage of MRI in spinal LCH is the delineation of extramedullary spinal cord compression by the soft-tissue component associated with the bony lesion; or secondary myelomalacic changes. Skeletal survey is imperative to rule out other sites of involvement. Osseous LCH lesions are usually isointense to muscle on T1-weighted MR images and markedly hyperintense on T2-weighted images.[7] Newer imaging modalities for investigation of multisystem LCH include whole body MRI, and fluorodeoxyglucose-positron emission tomography.

The radiological differential diagnosis includes skeletal metastasis, osteoblastoma, aneurysmal bone cyst, osteomyelitis, brown tumors of hyperparathyroidism, multiple myeloma, etc. Definitive diagnosis can be made by histopathology.[2]

The usual treatment for disease limited to only skeletal system is by local therapy including intralesional steroid, curettage or excision with almost 70-90% response rates. For more widespread systemic disease, systemic chemotherapy is useful.

Indications for radiation in adult patients are possibly: Recurrent disease after local treatment, progressive local disease, impending spinal cord compression, pain relief and for sites where local curative treatment is not possible. 3DCRT is the preferred technique and radiation dose varies from as low as 5 Gy to higher doses such as 15 Gy or more with improved response. A dose range of 6-15 Gy for treatment naïve patients and 8-15 Gy for previously treated patients has been found useful in a study from University of California.[8]

In our patient, he was a middle-aged man of 43 years in contrary to common presentation in childhood. He presented with cervical vertebral involvement with a soft-tissue mass in the nape of the neck with associated hearing loss, which is an extremely rare presentation as most of the time patients present with pain. However, later on he developed neck pain radiating to arm. We have treated the patient with radiation

alone considering that the disease was localized, inoperable and associated with neurological symptoms and soft-tissue mass. The response to treatment was very good and the soft-tissue mass has resolved. Neurological symptoms except hearing loss have also improved. This is an unusual presentation of LCH. The presentation with neck mass needs to be differentiated from soft-tissue sarcomas to avoid improper treatment. Immunohistochemistry is an important tool to differentiate it from other entities. To the best of our knowledge presentation with hearing loss is rarely reported in the literature.

References

1. Favara BE, Feller AC, Pauli M, Jaffe ES, Weiss LM, Arico M, *et al*. Contemporary classification of histiocytic disorders. The WHO Committee On histiocytic/reticulum Cell proliferations. Reclassification Working Group of the Histiocyte Society. Med Pediatr Oncol 1997;29:157-66.
2. Sapkas G, Papadakis M. Vertebral Langerhans cell histiocytosis in an adult patient: Case report and review of the literature. Acta Orthop Belg 2011;77:260-4.
3. Hicks J, Flaitz CM. Langerhans cell histiocytosis: Current insights in a molecular age with emphasis on clinical oral and maxillofacial pathology practice. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2005;100:S42-66.
4. Bunch WH. Orthopedic and rehabilitation aspects of eosinophilic granuloma. Am J Pediatr Hematol Oncol 1981;3:151-6.
5. Bollini G, Jouve JL, Gentet JC, Jacquemier M, Bouyala JM. Bone lesions in histiocytosis X. J Pediatr Orthop 1991;11:469-77.
6. Bertram C, Madert J, Eggers C. Eosinophilic granuloma of the cervical spine. Spine (Phila Pa 1976) 2002;27:1408-13.
7. Diederichs G, Hauptmann K, Schröder RJ, Kivelitz D. Case 147: Langerhans cell histiocytosis of the femur. Radiology 2009;252:309-13.
8. Selch MT, Parker RG. Radiation therapy in the management of Langerhans cell histiocytosis. Med Pediatr Oncol 1990;18:97-102.

How to cite this article: Mondal D, Julka PK, Jana M, Walia R, Chaudhuri T. Langerhans cell histiocytosis of atlantoaxial joint in a middle-aged man presenting with deafness as first symptom and soft-tissue mass at neck showing excellent response to radiotherapy alone: Report of an extremely rare and unusual clinical condition and review of literature.
Ann Indian Acad Neurol 2014;17:429-32.
Received: 17-01-14, **Revised:** 23-02-14, **Accepted:** 02-03-14

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