LANGERHANS CELL HISTIOCYTOSIS OF THE TEMPORAL BONE

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HISTIOCITOZA LANGERHANSOVIH ĆELIJA TEMPORALNE KOSTI

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ABSTRACT

Langerhans cell histiocytosis (LCH) is a disease of unknown etiology which is characterized by the pathological proliferation of Langerhans cells in various organs. The incidence of Langerhans cell histiocytosis in the adult population is approximately one to two cases per million, and presentation ranges from 15 to 91 years old. Although this disease may arise in various tissues such as the skin, hypothalamus, liver, lung, or lymphoid tissues, it most frequently occurs in the head and neck. The diagnosis is obtained by evaluating the patient's clinical presentation, radiographic imaging, and biopsy results. The most frequent radiological patterns observed are osteolytic lesions, periosteal reactions, and soft tissue masses. Since LCH manifests radiologically in different ways, its diagnosis should be first suspected by the radiologist and then confirmed by immunohistochemical analysis. In this case study, the patient is a 47 year old male presenting with isolated LCH of the left temporal bone. The patient described a history of pain in the left ear and mild deafness over the past three months. Radiographic imaging confirmed mastoid bone destruction with an expanding soft tissue mass infiltrating the dura of the medial and hind skull pit, without penetration into the endocranium, middle ear, or cavum tympani. Langerhans cell histiocytosis was later confirmed by immunohistochemical analysis.

Key words: *Langerhans cell histiocytosis, temporal bone*

SAŽETAK

Hisiocitoza Langerhansovih ćelija je retka bolest nepoznate etiologije koju karakteriše proliferacija patoloških Langerhansovih ćelija u različitim organima. Incidenca bolesti je jedan do dva na milion u odrasloj populaciji. Iako se bolest može naći u različitim tkivima: koža, hipotalamus, jetra, pluća, limfno tkivo, kost je najčešće zahvaćena, a glava i vrat su najčešća lokalizacija. Dijagnoza se postavlja na osnovu kliničke slike, radioloških nalaza i biopsije. Najčešći radiološki nalaz je osteolitička lezija, periostalna reakcija i meko tkivna masa. Uprkos nekoliko radioloških manifetacija, njenu dijagnozu bi trebalo da postavi radiolog, a definitivno potvrdi imunohistohemijska analiza. Prikazan je pacijent muškog pola, star 47 godina sa izolovanom LCH leve temporalne kosti. Istorija bolesti duga tri meseca sa bolom u levom uvu i nagluvošću. Radiološki utvrđena destrukcija kosti mastoida sa ekspanzivnom meko tkivnom masom koja infiltriše duru srednje i zadnje lobanjske jame, bez prodora u endokranijum, unutrašnje uvo i cavum tympani. Imunohistohemujski utvrđena Hisiocitoza Langerhansovih ćelija .

Ključne reči: *Histiocitoza Langerhansovih ćelija, temporalna kost*

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INTRODUCTION

Langerhans cell histiocytosis (LCH) is a disease of unknown etiology, which is characterized by the pathologic proliferation of Langerhans cells in various organs. In 1953, Lichtenstein observed cytoplasmic bodies, known as X bodies, within the histiocytes of tissues from patients suffering from eosinophilic granulomas, Hand-Schuller-Christian disease, and Abt-Letterer-Siwe disease. The incidence of LCH is slightly greater in males and generally presents in childhood. The incidence of LCH in the adult population is between one to two cases per million, and the prevalence appears to be higher among caucasians. Although this disease may arise in various tissues such as the skin, hypothalamus, liver, lung, or lymphoid tissue, it most frequently occurs in the bones. Specifically, LCH occurs most commonly in the head and neck; the skull is involved in 50% of cases, the temporal bone, meatal skin, and cervical lymph nodes in 20-25% of cases, and the maxillary and mandibular bones in 5 to 10% of cases (1, 2, 3).

The pathogenesis of LCH is not well understood, and there is an ongoing debate over whether this is a reactive or a neoplastic process. Arguments supporting the reactive nature of LCH include spontaneous remission, the failure to detect aneuploidy, metaphase and karyotypic abnormalities, and a promising survival rate in patients without organ dysfunction. On the other hand, the infiltration of organs by aberrant cells, potentially lethal disease progression, and successful treatment with cancer-based modalities are consistent with a neoplastic process. Furthermore, evidence exists for a role of immune dysfunction in the pathogenesis of LCH.

The clinical picture of LCH in young adults typically consists of solitary calvarial lesions, most frequently in the skull. Other sites of involvement include the vertebra, rib, mandible, femur, ilium, and scapula. Lesions are usually asymptomatic, but bone pain may occur. When the calvarial lesions extend into the nervous system, a variety of neurological manifestations may be observed. For example, bony lesions may promote middle ear inflammatory processes combined with mastoid destruction.

The diagnosis of LCH is obtained by examining the patient's clinical presentation, radiographic imaging, and biopsy, and by detecting Birbeck granules in the lesion cells using electron microscopy. Alternatives to diagnosis include positive staining for CD1a antigen on the surface of lesional cells, S-100 protein analysis, and adenosinetriphosphatase assays (4, 5).

The treatment of LCH depends upon the combination of clinical findings. Solitary bone lesions are treated by excision; painful bone lesions may require intralesional steroid injections; and polyostotic bone lesions are best treated using systemic steroids. Lesions that are unusually large and/or painful and occur in inaccessible sites or are involved in vital structures may require radiation (3-6 Gy) for treatment. Localized skin disease is best treated with topical steroids.

More than one half of patients younger than two years of age with disseminated LCH and organ dysfunction will die of the disease, whereas the outcome in the adult population is generally promising due to slow disease progression and favourable response to treatment. However, elderly patients and patients with chronic disease typically do not respond well to treatment. LCH is further complicated by an unpredictable course of progression; however, if additional lesions do not appear within one year following treatment, the later development of such lesions is unlikely (6).

CASE STUDY

Patient J.M. was a 47 year old male who was admitted to the clinic on November 10, 2008 (medical history number 40968). He presented with diminished hearing in the left ear, pain in the left ear region, humming in the left ear, and occasional vertigo. The patient's condition had been diagnosed three months prior to admission and was characterized by pain in the left ear, diminished hearing in the left ear, and vertigo. Upon admission to the clinic he received treatment for otitis externa as well as vertigo. The patient's symptoms improved, however slight deafness and pain in his left ear persisted.

Upon clinical examination it was determined that the patient had palpatory sensitivity to pain over the retroarticular region of the left ear, and that the bony external auditory channel had narrowed and the upper wall brought down, with no visible perforation of the ear drum. The patient's clinical findings included the following:

Audiometric findings: mixed, average-to-severe hearing damage in left ear and normal results in the right ear.

Tympanometry: normal findings, bilateral curve A.

Laboratory results: measurements within normal range except SE 26 and CRP 13.30.

Mastoid radiography: mastoid cell destruction with formation of a confluent hole in the left mastoid.

Mastoid CT: soft tissue mass in the left mastoid filling the mastoid hole but not covering the cavum tympani. There is destruction present in the out er mastoid wall, mastoid tegmen, and sigmoid sinus toward the hind skull pit (pictures 1 and 2).

MR: soft tissue mass destruction of the temporal bone (mastoid) which is natively heterogenic in appearance with no evident spreading to the middle ear or cavum tympani. After administration of contrast-intensive T1W, a significant signal increase in the tumor was observed. Mastoid roof bone destruction and the posterior-base segment of the temporal part of the brain significantly correlated with the dura, which was suspected to be infiltrated in the absence of penetration into the endocranium. Bone destruction was observed toward the hind skull pit with suspected dural infiltration. The left sigmoid sinus was narrowed compared to the right, and blood flow had slowed down through this sinus (pictures 3 and 4). Lungs Rtg normal.

A mastoidectomy was performed as well as a biopsy at a different health care institution, and tissue was sent for pathohistological and immunoistiochemical examination. Pathology studies eventually confirming Langerhans cell histiocytosis, characterized by eosinophilia between tumor cells and S100 protein- and CD1a-positive tumor cells.

DISCUSSION

The signs and symptoms of otologic histiocytosis may mimic those of acute or chronic infectious ear disease (7). In Langerhans cell histiocytosis, the temporal bone is typically involved and appears on radiographs as extensive lytic lesions associated with soft-tissue masses (8).

The first diagnostic test typically performed for LCH is the plain radiograph; however, the radiological findings may be difficult to analyze and may mirror many other pathologies. The most frequent symptom associated with LCH is pain, and the most common radiological manifestations are primarily osteolytic lesions (45 out of 59 patients). Periostal reactions and soft tissue masses were also found in 30% of patients. Despite the fact that LCH may be difficult to diagnose radiologically, it should at least be suspected by the radiologist when the abovementioned signs are observed (9).

In our case study, the first symptom reported by the patient was pain, and subsequent otoscopy demonstrated narrowing of the external auditory channel. This narrowing consequently leads to otoneurological symptoms, including deafness, vertigo, loss of balance when walking, as well as pain in the mastoid region and palapatory mastoid sensitivity. Laboratory findings in our case study were within normal, with the exceptions of SE(26) and CRP(13.30). Mastoid radiography was performed and showed significant mastoid cell destruction forming a confluent hole in the left mastoid region. After performing CT and MR scans, serious mastoid destruction accompanied by tegmen and bone destruction around the sigmoid sinus with soft tissue masses was observed, and this was accompanied by infiltration into the dura of the medial and back skull pit. Involvement of the endocranium, middle ear, and cavum tympani was not observed. Following injection of contrast, there was a significant increase in T1W signal in the region of the tumor, allowing for exclusion of holesteatoma from the differential diagnosis. The patient's clinical presentation was not suggestive of osteomielitis, and the patient was in overall good condition. The patient showed no signs of enlarged lymph nodes, serious bone destruction, or extensive soft tissue masses, thus malignant disease was not suspected. A final diagnostic biopsy was required to determine the exact patohistiological and immunohistochemical status.

Currently there have been no controlled studies in the literature establishing the optimal treatment protocol for LCH. The prognosis for LCH in adults is generally good due to the slow progression of the disease and its favourable response to treatment. The treatment of LCH is controversial, particularly when dealing with localized LCH in the head and neck. Many researchers believe that surgery alone is too invasive in such cases. However, most clinicians recommend surgical intervention associated with some other form of treatment such as corticosteroid therapy, chemotherapy, or radiotherapy on focal lesions. Multifocal lesions, however, require more aggressive therapeutic approaches (7,10).

Once initial bone imaging and radiological analyses have been performed to determine the stage of disease, additional analyses should be obtained every six months for the next three years. If additional lesions do not appear within one year, the development of such lesions over time becomes highly unlikely. Full recovery is expected in cases of single lymph node involvement or isolated skin lesions; however, lesions that are unusually large and painful or occur in inaccessible sites or vital structures may require radiation (3-6 Gy).

Complications of treatment occur in 30-50% of LCH patients. For example, patients with multisystemic disease, craniofacial involvement, chronic LCH, or disease reactivation may be at higher risk of developing diabetes insipidus over time (4).

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