Intraosseous Lipoma of the Lumbar Spine

Jong Tae Kim, M.D., Young Min Han, M.D., Dong Sup Chung, M.D., Young Sup Park, M.D.
Department of Neurosurgery, Our Lady of Mercy Hospital, The Catholic University, Incheon, Korea

Intraosseous lipoma is one of the rarest benign primary tumors of the bone, especially of the spine, but has been reported at increasing frequency. Only a few cases of intraosseous lipoma originating primarily in the spine were reported. Twenty-one-year-old male with intraosseous lipoma located in lamina and spinous process of the 4th lumbar vertebra, who presented with lower back pain is reported. And the clinical features, natural courses and treatments of this rare tumor are discussed with literature review.

KEY WORDS: Intraosseous lipoma - Lumbar vertebra.

Introduction

Lipoma is a very common tumor developed in soft tissue like subepithelium, however, intraosseous lipoma developed inside the bone is quite rare tumor showing less prevalence than 0.1% or 2.5% among primary tumors developed inside the bones. Intraosseous lipoma has been reported to occur usually in metaphyseal or epiphyseal regions of long bones such as femur, tibia, fibula, and calcaneus, but spinal intraosseous lipoma has been reported in only a few cases.

Currently, this kind of lesion are increasingly reported owing to the advancement of non-invasive and accurate diagnostic techniques like computed tomography (CT) and magnetic resonance imaging (MRI), and naturally the prevalence of actual intraosseous lipoma is probably much higher than the present expectation. We experienced the intraosseous lipoma developed in a region of the lumbar spine, and hereupon discuss clinical features, natural courses and treatments of this tumor through a case report with literature review.

Case Report

A 21-year-old male patient was hospitalized due to dull lumbar back pain for about three months. Physical examination did not show any particular findings and neurological examination also did not reveal any motor and sensory dysfunctions. On simple radiograph of the lumbar spine, an oval osteolytic lesion having a smooth borderline was observed in lamina and spinous process of the 4th lumbar vertebra but specific calcification or any osteoblastic lesion was not found (Fig. 1). The lesion which had a discrete, but irregular margin showed a low signal intensity on T2-weighted MRI and a mixed high and low signal intensity on T1-weighted MRI because it had undergone some involutional changes.

No definite enhancement of the lesion was observed on Gadolinium-DTPA infusion study (Fig. 2).

The operation of the lesion was done through partial hemilaminectomy and tumor removal. In the surgical field, the tumor was soft and pale brown-colored and was easily removed.

On pathohistological examination, the lesion consists of mature adipocytes and atrophic bony spicules, devoid of
The lipoma primarily developed in the bone is a quite rare disease reported to have less than 0.1% prevalence in primary bone tumors, which are naturally involuted through the courses of infarction, calcification, cyst formation and reactive bone formation. The pathogenesis of the intraosseous lipoma is not defined yet, but there are some possible hypotheses. A generally accepted theory is that a true tumor is developed in intraosseous adipose tissue, and one of other proposed possibilities is a reactive osseous change by trauma, infection, vascular compromise, etc. The prevalence of this disease has been known to be nearly same between males and females, but some reports showed more prevalent in males. Although the age distribution is wide from the young to the old, it is frequently developed mainly between thirties and fifties.

Most of the intraosseous lipomas are generally known to develop in metaphyseal or epiphyseal regions of long bones (femur, tibia, fibula, and humerus) and calcaneus, but some cases are reported to have developed in spinous process, vertebral body, coccyx, and sacral vertebra. Nonetheless, the intraosseous lipoma in spinous process and lamina of the lumbar vertebra like the present case has been quite rarely reported. The intraosseous lipoma is generally found as solitary mass, but multiple mass are very un-common.

The vast of majority of cases are incidentally discovered without any special symptoms and found during the examinations for other diseases, however, these lesions in a few cases sometimes accompany non-specific symptoms such as dull pain. Pathologic fracture is also found in very few cases. In the current case, a lower back pain has been continued for a considerable period. But it is obscure that the lower back pain occurred due to the tumor or not because a degenerative change is also being progressed in the adjacent disc on MRI.

Milgram subdivided the lesions into three stages according to a degree of involution. Stage I is a solid tumor of viable lipocytes, and stage II appears in transitional cases showing viable lipocyte region, partial fat necrosis, and focal calcification region. Stage III shows adipose tissue necrosis and the reactive new bone formation of specific morphology such as cyst formation or calcification in different degrees, which are caused by the fat necrosis.

The radiological findings are dependent on the stage of the lesion. On the plain roentgenography, the lesion consisting of solid fat cells in the stage I is observed to be a lesion showing low density accompanied with resorption of the preexisting bone and expansion of the original cortex. This lesion is progressed to involution and to fat necrosis near the central region of the low density lesion, and consequently a smaller central calcified region is observed. The stage III lesion represents more degenerative changes, that is, considerable reactive ossification is observed near the calcified fat on the outer rim of the low density region.

The lesion presented on CT and MRI was observed to have the same findings as in the normal adipose tissue. Particularly, CT helps the detection of minute calcified lesions that are not detected by plain radiography. Low level
Intraosseous Lipoma

Lesions are demonstrated as a fat signal, showing high signal intensity on both T1 and T2 weighted MR images. However, MRI makes it possible to observe a variety of signal intensities in a case of progressive involution, and to evaluate a formation of cysts and a degree of the involution. Furthermore, the conversion into low signal intensity of lipomas by a fat suppression technique in MRI, helps to guide diagnosing lipomas from other diseases. In the present case, the lesion shows mixed signal intensity on T1-weighted image, but the low signal intensity region on T1-weighted image appears hyperintense on T2-weighted image. This finding can be interpreted as the tumor involution (cystic or myxomatous degeneration).

The intraosseous lipoma is histologically formed of mature adipose cells, and is diversely observed to be thinned bony trabeculae, extensive fat necrosis and calcification, deposition of eosinophilic osteoid material and reactive new bone formation according to the progress of the evolution.

The intraosseous lipoma, a benign lesion, is trended to be spontaneously involuted mostly. However, Milgram et al. stated that it is not always a benign tumor and malignant changes have been reported in a few cases, so they recommended to consider this fact in treatment. Though there are some malignant cases, most of the lesions are benign and show a tendency to naturally degenerate. Therefore, many physicians suggest curettage or local excision of the lesion as the treatment of choice. Only observation is suitable enough for the stage III lesion, because it is a fixed state of considerable degenerative changes.

Conclusion

Intraosseous lipoma has been known as a considerably rare tumor having less prevalence than 0.1% or 2.5%, but recently the relevant reports have been increased with general clinical uses of CT and MRI.

Accordingly, total prevalence is probably more common than the fact known so far. Because of its specific courses different from other osseous tumors, the intraosseous lipoma needs to undergo precise differential diagnoses through radiologic and histologic examinations preoperatively and postoperatively, and also needs adequate treatments according to each stage. Malignant changes can develop even in the quite unusualness, and therefore, a malignant possibility should be considered in determining a treatment plan.

References