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Osteoid Osteoma in the Thorasic Spine

Torasik Omurgada Osteoid Osteoma

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ABSTRACT

Osteoid osteoma is a benign skeletal neoplasm composed of osteoid and woven bone. The majority of the lesions arise in the cortex of long bones. Osteoid osteoma of the spine is a rare primary spine tumor and those located at the thoracal spine are even rarer. The usual treatment involves complete resection, including the nidus, or alternatively radiofrequency percutaneous ablation is performed. The authors present a 32-year-old female with an unusual localization of the osteoid osteoma in the thoracal spine where imaging modalities were not conclusive for the diagnosis. The T1 vertebra lesion was successfully resected via a posterior approach with T1 laminectomy, including right side C7 and T1 foraminotomies, and vertebroplasty were performed. Histopathology reported the lesion as an osteoid osteoma.

KEY WORDS: Osteoid osteoma, Scintigraphy, Spine

ÖZ

Osteoid osteoma iskelet sisteminin benign neoplazmı olup, osteoid ve yeni kemikten oluşmaktadır. Lezyonların büyük kısmı uzun kemiklerin korteksinden köken almaktadır. Osteoid osteoma omurganın nadir tümörlerinden olup, torakal bölgede yerleşim daha da nadir izlenmektedir. Yazarlar bu çalışmada, 32 yaşındaki torakal omurgada nadir olarak izlenen ve görüntüleme yöntemleri ile tanı konulamayan bayan hastada, osteoid osteoma vakasını sunmaktadır. Arkadan yaklaşımla T1 vertebra lezyonuna yönelik T1 laminektomi, sağ C7 ve T1 foraminotomi ve vertebroplasti yapıldı. Histopatoloji lezyonu osteoid osteoma olarak rapor etmiştir.

ANAHTAR SOZCÜKLER: Osteoid osteoma, Sintigrafi, Omurga

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INTRODUCTION

Osteoid osteoma (OO) is a relatively common skeletal lesion that accounts for approximately 12% of benign skeletal neoplasms (2). The most common type is cortical osteoid osteoma while cancellous (also referred to as medullary) osteoid osteoma, intermediate in frequency, has a site predilection for the femoral neck, small bones of the hand and foot, and the vertebral posterior elements. Cancellous and subperiosteal osteoid osteomas typically arise in an intraarticular or juxtaarticular location (6).

When osteoid osteoma occurs in the spine, the most commonly affected area is the lumbar spine, typically the neural arch (4,13). Lesions limited to the vertebral body are unusual (13). Almost invariably, the presenting complaint is pain, varying between mild and intermittent to constant and severe (4). The response to aspirin is equivocal, with authors reporting the relief of pain as between 30% and 75 % (11,14). Most patients eventually require surgical treatment for complete relief of pain. The classic approach to this lesion is direct surgical excision or curettage. In recent years, several computed tomography (CT)-guided percutaneous techniques like radiofrequency ablation have been used to destruct the lesion (15). The reported results seem to be satisfactory and patients were noted as pain free with no complications, with minimally invasive treatment for OO.

CASE REPORT

A 32-year-old woman was admitted to our department for a bone scan. She had been complaining of severe back pain radiating to her right arm for more than a year that did not respond to non-steroidal anti-inflammatory medications.

She stated that cervical spinal magnetic resonance imaging (MRI) was performed three months ago. Her prior MRI evaluated the lesion most likely as an inflammatory lesion prominent at the T1 vertebra including C7 and T2 vertebra with extensive edema (Figure 1). Her cervical and thoracic MRI were repeated which revealed a nodular lesion ~1 cm in size located at the posterior T1 vertebra with intermediate signal intensity (SI) on T2-weighted sequences and hypointensity on T1-weighted sequences. When IV contrast (gadolinium) was given, mild heterogeneous contrast enhancement was seen at the periphery of the lesion. It was reported as an atypical hemangioma (Figure 2 A,B,C). Thoracal CT showed a lesion extending from the right side of the corpus to the pedicle and lamina without yielding an expansion and a lytic area measuring 1x0,7 cm was noted with a cortical destruction. An extension of the lesion from the inferior lying neural foramina to the extrapleural fat tissue without well demarcated borders was visualised and reported as a non-specific soft tissue mass (Figure 3 A,B).

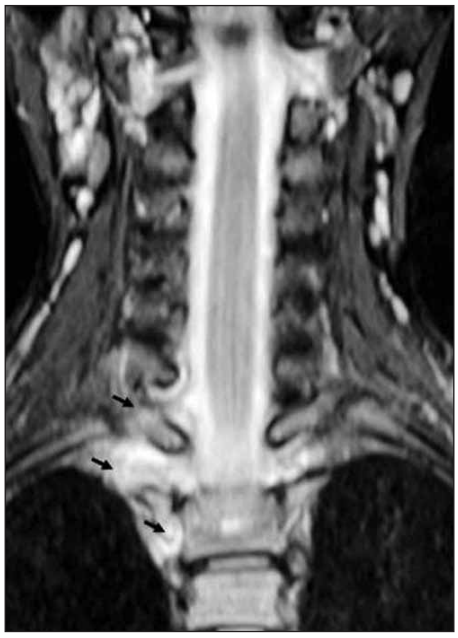

Figure 1: *On T2-weighted coronal MRI, the lesion is most likely an inflammatory lesion prominent at the T1 vertebra and including the C7 and T2 vertebra with extensive edema (black arrows).*

Her thorough laboratory examinations consisting of infection markers (e.g. Brucella) were negative.

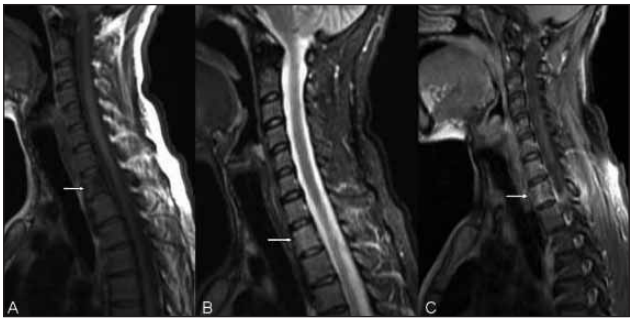

Figure 2: *On T1-weighted sagittal MRI, a nodular lesion ~1 cm in size located at the posterior T1 vertebra with hypointensity (white arrow) (**A**); on T2-weighted sagittal MRI, an intermediate signal intensity (SI) was seen (white arrow) (**B**); IV contrast (gadolinium) was administered and mild heterogeneous contrast enhancement was seen at the periphery of the lesion (white arrow) (**C**).*

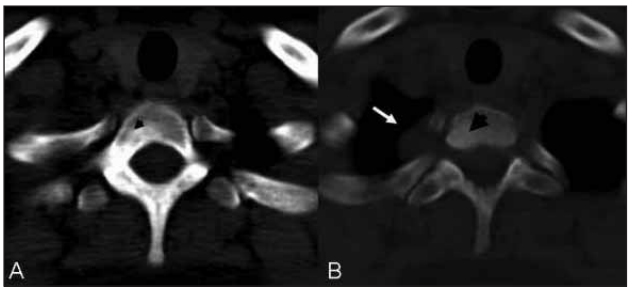

Figure 3: *Thoracal axial CT showed a lesion extending from the right side of corpus to the pedicle and lamina without yielding an expansion and a lytic area measuring 1 x 0.7 cm was noted with a cortical destruction (black arrow) (**A**), IV contrast (gadolinium) was given and the extension of the lesion from the inferior lying neural foramina to the extrapleural fat tissue without well demarcated borders was visualised and reported as a non-specific soft tissue mass (white arrow) (**B**).*

She had three phase bone scan with technetium-99m methylene diphosphonate (Tc-99m MDP) which showed focal hyperemia at blood pool images and increased osteoblastic activity at the right site of the first thoracal vertebra. The uptake in the skeleton was physiological other than this solitary lesion (Figure 4). Ga-67 scintigraphy was performed for the suspected vertebral infection. No pathological activity uptake was detected at planar and SPECT Ga-67 images.

Decompression surgery was decided on to alleviate the pain that had affected her quality of life. The tumor was totally removed via a posterior approach with a median incision beginning from C7 to T2 vertebra level. T1 laminectomy including right side C7 and T1 foraminotomies were performed regarding the right C7 and T1 motor and sensory rootlets compression. The tumor, which was relatively hard to remove, was located in the right side of corpus and costovertebral junction and did not adhere to the spinal cord. The tumor was extracted after a microsurgical drilling of right T1 one third of corpus and costovertebral junction. After drilling the one third of T1 corpus, vertebroplasty was performed in order to get pain relief and provide stability to the corpus. We were not able to reach the extrapleural part of the tumor and decided to wait for the pathology result thereafter consulting our chest surgeons. The patient was satisfied with the post-operative period and her neurological examination was normal. There was no repetition of pain neither due to surgery nor to residual tumor during clinical follow-up.

Post-operative thoracal CT showed total removal of T1 lamina with hyperdensity due to bone cement in the corpus of the T1 vertebra. No contrast enhancement was seen at the operational area with IV contrast (gadolinium) (Figure 5).

DISCUSSION

Ten to twenty percent of OO occurs in the spine, with the commonest location being the lumbar vertebra as 59% (3). Typical symptoms of OO such as night pain and pain relief with aspirin are reported

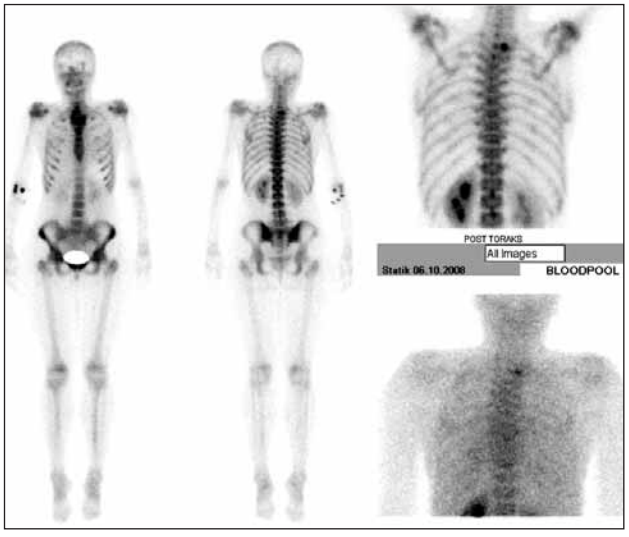

Figure 4: *Three-phase bone scan with Tc-99m MDP revealed hyperemia at the upper thoracic region at blood pool images and increased osteoblastic activity at the right side of the T1 vertebra.*

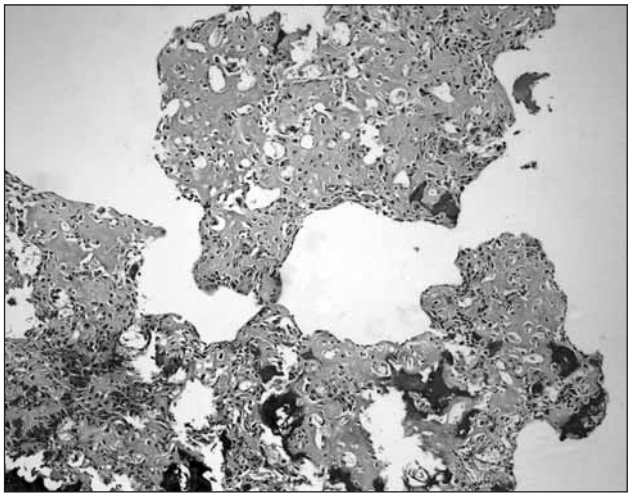

Figure 5: *Osteoid osteoma with anastomosing trabeculae of woven bone. There is exuberant new osteoid and bone formation by plump osteoblasts (H&E x 200).*

to occur only in one half to two thirds of patients (6). Our patient had continuous pain and did not respond aspirin treatment.

The classical history may not always be elicited in axial skeleton lesions, leading to long diagnostic delays of up to 1–2 years, complex anatomy like spine as was the case in our patient (12,16).

Edema is one of the major manifestations of the MRI findings. Grading of the edema was previously described and our patient's lesion was consistent with extensive edema more than grade 3 (edematous change circumferentially distributed around the nidus) with or without involvement of the adjacent soft tissues and respectively evaluated as grade 4. The MRI report of our patient was consistent with marrow edema and local inflammation by showing decreased signal intensity on T1-weighted and increased signal intensity on T2-weighted images (5). The nidus was not delineated preciously because of the extensive edema involving the soft tissue (extrapleural fat tissue). An additional finding of the MRI was the extension of the lesion into the adjacent vertebral body. The correct diagnosis was not made radiologically due to the inconclusive imaging findings. Bone scintigraphy has been advocated to localise the vertebral level with clinically suspected OO, leading to CT examination to define the nidus. Bone scintigraphy in cases of OO is almost invariably positive (7,14). Triple phase imaging is helpful in order to show the lesion has vascular nature. Our case has supported these findings showing focal hyperemia at blood pool phase and increased osteoblastic activity at the late phase images at the T1 vertebra level. MRI has been considered to produce misleading appearances and cause diagnostic errors due to presence of associated soft tissue mass, bone marrow oedema and joint effusion (1,10). This was also true in our case. Unfortunately, the characteristic appearance of OO on CT as the presence of a low-attenuation nidus with central mineralization and varying degrees of perinidal sclerosis was also not prominent (3). Surgical treatment was decided on for the complete relief of pain although a definitive diagnosis had not been established. T1 laminectomy, right sided C7 and T1 foraminotomies, and vertebroplasty were performed.

Osteoblastoma should be considered in the differential diagnosis. Small osteoblastoma lesions in the spine are very similar to OO both radiologically and clinically. OO has a limited growth potential and rarely exceeds 1,5 cm whereas osteoblastoma does not have this growth limitation and may have an aggressive clinical course, with cases of malignant transformation also reported (8) (Figure 6 A,B,C). Osteoblastoma is less painful and does not respond salicylate treatment (6). The differential diagnosis also includes degenerative disc and facet joint disease and spondylolysis (9). In our patient the disc was normal as well as the adjacent vertebral end plates, both commonly affected in degenerative disease. The age of the patient led us to consider other differential diagnosis. The marrow edema caused by the OO could be attributed to malignancy or previous trauma. The size of the initial lesion on MRI and at follow-up examinations as well as the use of other imaging modalities such as scintigraphy will be helpful in distinguishing the lesion from malignancy. A full medical history regarding trauma is mandatory.

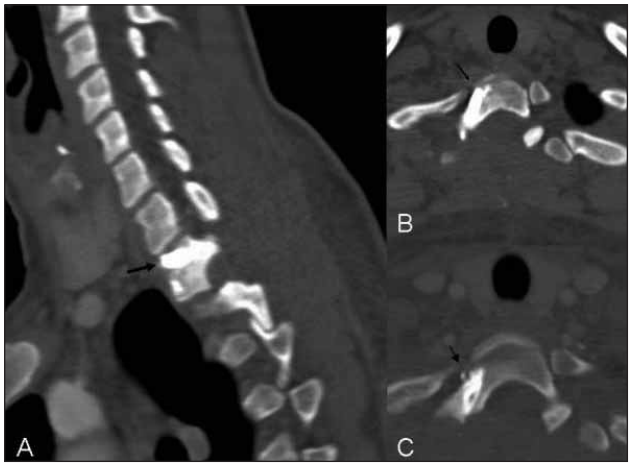

Figure 6: *Thoracal axial CT showed total removal of T1 lamina with hyperdensity due to bone cement in the corpus of the T1 vertebra (black arrow) (**A**), IV contrast (gadolinium) was given and no contrast enhancement was seen at the operational area (black arrows) (**B**) and (**C**).*

In conclusion, the diagnosis of OO may be strongly suggested by radiological and clinical findings, which may occasionally be unclear as in our case. A definitive diagnosis is made by the histological examination, which may be inconclusive in small osteoblastomas with strikingly similar histological features with OO.

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