Case Report
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Juxtacortical Osteoma of the Metatarsal Bone: A Case Report
중족골에서 발생한 골막 골종: 증례 보고

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Osteoma is a benign bone-forming tumor composed of compact or mature trabecular bone and is limited almost exclusively to craniofacial bones, especially in the paranasal sinuses and mandible. It is typically a slow growing lesion that is asymptomatic, unless its size significantly increases to cause symptoms such as pain or other neurological symptoms, that happens more often in cases involving craniofacial bones. Radiological appearance of these tumors depends on their location. In cases of juxtacortical osteoma, it is crucial to differentiate between this type of tumor and parosteal osteosarcoma, sessile osteochondroma, and matured juxtacortical focus of myositis ossificans. However, in some cases, it is difficult to differentiate juxtacortical osteoma from above mentioned lesions only with radiologic appearance. We describe a case of an osteoma that arose from the second metatarsal bone, a rare anatomical location for osteoma.

Index terms
Bone Neoplasms
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INTRODUCTION

Osteoma is a benign bone-forming tumor composed of compact or mature trabecular bone and is limited almost exclusively to craniofacial bones, especially those of paranasal sinuses (1). This tumor occurs more often in females (1, 2). It is a slow growing lesion that is usually asymptomatic, unless it enlarges and causes symptoms (1-3). Its radiological appearance depends on its location. Central osteomas are circumscribed sclerotic lesions with smooth borders, whereas peripheral or juxtacortical osteomas are radiopaque lesions with expansive borders that can be sessile or pedunculated (2, 4). Most osteomas are solitary; when osteomas are present at multiple sites, Gardner's syndrome should be considered (1-3). In cases of juxtacortical osteoma, it is crucial to differentiate between this type of tumor and parosteal osteosarcoma, sessile osteochondroma, and matured juxtacortical focus of myositis ossificans (2, 3, 5). We describe a case of an osteoma arising from the second metatarsal bone, a rare anatomical location for osteoma. To our knowledge, this is the first reported case of osteoma of the metatarsal bone. The tumor was removed surgically and had lamellar bone, suggesting osteoma.

CASE REPORT

A 61-year-old woman was presented to our hospital complaining of right foot pain. This symptom had started 1 month prior and was worse with ambulation. She did not report history of trauma and had no external wounds. On physical examination, she had tenderness on the dorsal aspect of the second metatarsal area. Laboratory findings were normal. Plain radiograph revealed a small, well-demarcated, exophytic sessile osseous lesion arising from the shaft of the right second metatarsal bone (Fig. 1A).

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MRI revealed a mass lesion arising from the mid-shaft of the second metatarsal bone, showing homogeneously low signal intensity on T1- and T2-weighted images compared to that of the foot muscle (Fig. 1B, C). This mass revealed the same signal intensity as the bony cortex, had clear cortical margins, and no evidence of a cartilaginous cap. After intravenous administration of gadolinium, the mass did not reveal enhancement (Fig. 1D). Based on imaging findings, our tentative diagnosis was benign osteochondroma, and differential diagnosis included bizarre parosteal osteochondromatous proliferation, parosteal osteoma, and parosteal osteosarcoma. The patient underwent surgical excision of the lesion after interdepartmental discussion. Gross specimen was a 1.5 × 0.8 × 0.5-cm-sized solid mass with grayish-white firm bony tissue and without cartilage formation on the surface of the cut. Histological examination revealed mature bone tissue organized in wide lamellar patterns, with multiple osteocytes inside the lacunas (Fig. 1E, F). The excised mass was diagnosed as an osteoma.

DISCUSSION

Osteoma of bone other than the skull or facial bones is extremely rare (2, 6, 7). Small lesions are usually asymptomatic and are identified incidentally (2, 3). Juxtacortical osteoma is a distinct entity and is diagnosed based on clinical, radiographic, and histological features (2). Usual presentation of the lesion is as an asymptomatic and radiographically long-standing uniform dense sclerotic lesion attached to the surface of the diaphysis or metadiaphysis of long bones in adults (2). In some reports, osteoma arising from craniofacial bones occasionally caused symp-

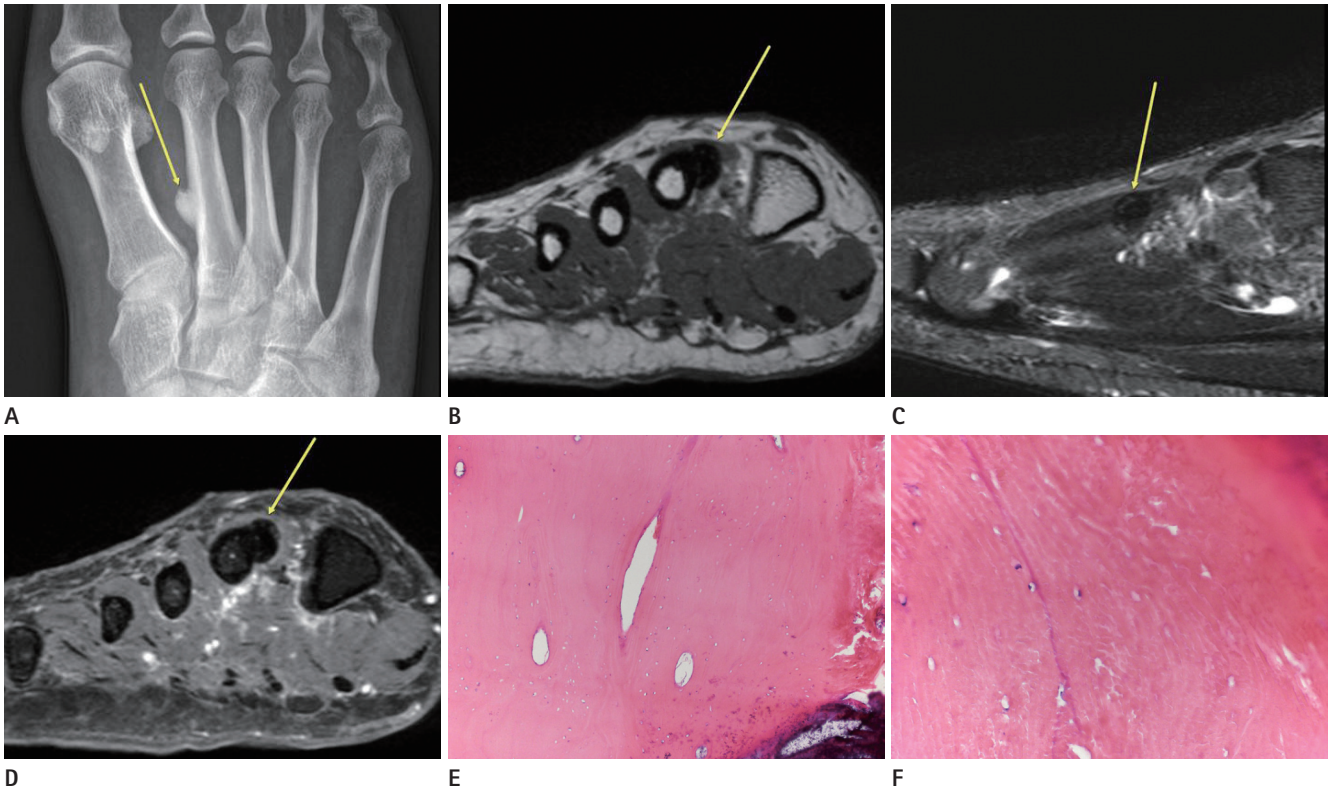

Fig. 1. Juxtacortical osteoma arising from the second metatarsal bone in a 61-year-old woman.
A. Anterior-posterior plain radiograph of the right foot showing a small, well-demarcated, exophytic, sessile, calcified mass in the shaft of the second metatarsal bone (arrow).
B–D. MR images of the second metatarsal bone. MR images reveal that the lesion has the same signal intensity as the cortical bone and reveals no cartilaginous cap. On coronal T1-weighted image (TR = 600, TE = 15) and sagittal, fat-suppressed, T2-weighted image (TR = 6000, TE = 100), the lesion is homogeneously hypointense (**B**, **C**, arrows). Contrast-enhanced, fat-suppressed T1-weighted image (TR = 600, TE = 15) reveal no enhancement (**D**, arrow).
E, F. Histopathology revealing that the tissue consists of mature lamellar bone with multiple osteocytes in lacuna [**E** (H&E stain, × 100) and **F** (H&E stain, × 400)].
H&E = hematoxylin and eosin, MR = magnetic resonance, TE = echo time, TR = repetition time

toms such as pain from mass effect from its large size (1-3). Foot pain has not been reported previously in literature, as juxtacortical osteoma from the foot bone is rare. To our knowledge, our patient is the first case to be diagnosed with an osteomafrom metatarsal bone. Because of its anatomical position, the osteoma may have caused pain from recurring stress on ambulation.

Basic imaging technique used to diagnose osteoma is conventional radiography, and the tumor typically appears as a homogeneous osseous mass with well-delineated smooth margins (5, 8). CT is helpful in evaluating presence of cortical invasion. A heavily ossified mass attached to the cortex with no areas of lucency or cortical invasion is a typical CT finding of osteoma (9). Low signal intensity of the mass seen in T1 and T2 sequences of MRI is suitable for assessment of cortical bone lesions (5).

Differential diagnosis of potential symptoms related to osteoma includes sessile osteochondroma, matured juxtacortical focus of myositis ossificans, and parosteal osteosarcoma, and it is particularly crucial to differentiating benign osteoma tumors from osteosarcoma (2, 3, 5). Osteochondromas can be distinguished from osteomas on MRI because osteochondromas have a cartilaginous cap that reveals high signal intensity on T2-weighted images and a medullary space that is continuous with the parent bone (9). Myositis ossificans occur after repeated trauma and progressively ossify from the periphery with time (3). Juxtacortical or surface osteosarcomas account for approximately 4% of osteosarcomas (3). Radiographically, parosteal osteosarcoma usually has an irregular margin; unlike osteoma, scattered areas of radiolucency or a heterogeneous appearance are often detected (2). Parosteal osteosarcomas incorporate surrounding soft tissues as they grow and therefore typically have an indistinct interface between surrounding soft tissue and the leading edge of the tumor on CT or MR imaging (2). Parosteal osteosarcoma may cause extrinsic erosion of thickened underlying diaphyseal cortex and perpendicular periosteal reaction extending into the soft-tissue component (10). On MRI, reactive marrow changes are commonly observed (10).

Since osteoma is a benign disease, invasive surgical treatment is not recommended. Recurrence is rare, and no malignant transformation has been reported (2). Therefore, close follow-up with conventional radiography or marginal resection is likely to be sufficient for osteoma.

We described a rare case of juxtacortical osteoma of the metatarsal bone. Because it was hard to differentiate between osteoma and other bone tumors radiographically, open biopsy was required to rule out malignant bone tumor.

REFERENCES

1. McHugh JB, Mukherji SK, Lucas DR. Sino-orbital osteoma: a clinicopathologic study of 45 surgically treated cases with emphasis on tumors with osteoblastoma-like features. *Arch Pathol Lab Med* 2009;133:1587-1593
2. Bertoni F, Unni KK, Beabout JW, Sim FH. Parosteal osteoma of bones other than of the skull and face. *Cancer* 1995;75:2466-2473
3. Gümüştaş S, Ağır İ, Tosun HB, İnan HM. An osteoma located on the radial head: a case report. *J Clin Anal Med* 2013;4(Suppl 3):269-271
4. Lambiase RE, Levine SM, Terek RM, Wyman JJ. Long bone surface osteomas: imaging features that may help avoid unnecessary biopsies. *AJR Am J Roentgenol* 1998;171:775-778
5. O'Connell JX, Rosenthal DI, Mankin HJ, Rosenberg AE. Solitary osteoma of a long bone. A case report. *J Bone Joint Surg Am* 1993;75:1830-1834
6. Greenspan A. Benign bone-forming lesions: osteoma, osteoid osteoma, and osteoblastoma. Clinical, imaging, pathologic, and differential considerations. *Skeletal Radiol* 1993;22:485-500
7. Baum PA, Nelson MC, Lack EE, Bogumill GP. Case report 560: parosteal osteoma of tibia. *Skeletal Radiol* 1989;18:406-409
8. Lee JK, Yao L, Wirth CR. MR imaging of solitary osteochondromas: report of eight cases. *AJR Am J Roentgenol* 1987;149:557-560
9. Inokuchi T, Hitora T, Yamagami Y, Nishimura H, Yamamoto T. Parosteal osteoma of the clavicle. *Case Rep Orthop* 2014;2014:824959
10. Murphey MD, Jelinek JS, Temple HT, Flemming DJ, Gannon FH. Imaging of periosteal osteosarcoma: radiologic-pathologic comparison. *Radiology* 2004;233:129-138

중족골에서 발생한 골막 골종: 증례 보고

김수지 · 박희진* · 이소연

골종은 치밀골 또는 해면골이 서서히 성장하면서 생기는 양성 골종양으로, 대부분 부비동과 하악골을 포함한 두개안면골에서 발생하고 그 외 위치에서는 잘 생기지 않는 것으로 알려져 있다. 대개 특별한 증상 없이 지내다가 방사선 촬영에서 우연히 발견되는 경우가 많고, 골종이 발생한 위치에 따라 혹은 크기가 많이 커지는 경우에는 두통, 동통, 부종 등의 증상이 생길 수도 있다. 골종의 영상의학적 소견은 그 발생 위치에 따라 다르게 나타난다. 골막골종의 경우 골막골육종, 무경성 골연골증, 피막에 성숙골이 위치한 골화성 근염 등과 감별하는 것이 중요하지만, 영상 소견만으로 이들 질환을 감별하기에 어려울 수 있다. 이에 저자들은 현재까지 보고된 바 없는 제2 중족골에서 발생한 골막골종의 영상 소견과 함께 수술적으로 제거한 증례를 문헌고찰과 함께 보고하는 바이다.

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