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Case Report

A case report of bone infarct: Imaging features in radiograph, computed tomography and magnetic resonance imaging.

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Abstract

Osteonecrosis or bone infarct implies ischaemic death of cellular elements of the bone and it's marrow in metadiaphyseal region. In early stage of infarction, clinical manifestations of osteonecrosis are not typical and plain roentenography examination is usually negative. Magnetic resonance imaging (MRI) plays an important role in early detection and diagnosis of the disease; thus reducing the number of complications, severity and morbidity associated with the disease. Computed tomography (CT) imaging is not the modality of choice for diagnosing early bone infarction; however for follow-up of bone infarction, CT is the optimal modality of choice. We intend to present a case of bone infarct in an adult patient for awareness about imaging findings and early identification of disease.

Keywords: Bone infarct, serpiginous Osteonecrosis, Double line sign.

Introduction

Osteonecrosis or bone infarct implies ischaemic death of cellular elements of the bone and it's marrow in metadiaphyseal region.[1] 77% of cases involve lower limbs. These lesions usually occur at multiple sites and most frequently are symmetrical. It is predominantly seen in male patients around middle age.[1] Most common sites are distal end of femur, proximal tibia and proximal humerus. Patients with features of bone infarction are usually asymptomatic or may be mildly symptomatic. Bone marrow of long bones are rich in fatty tissue, with small marrow nutrient vessels that are easily embolised leading to bone infarcts. The basic pathological change in osteonecrosis is divided into stages of cell necrosis and phases of bone repair. The basis of these stages can be seen on MRI. Bone infarctions have numerous etiologies with distinctive imaging features on conventional radiography, CT and MRI.

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Case History

A 52 year old female patient presented with left knee pain since 20 days and worsened progressively. On local examination there was mild swelling and tenderness. There was no history of recent infection or trauma. General physical examination is unremarkable. Vital signs were within normal limits. Past history of rheumatoid arthritis since 8 years and on immunosuppressant treatment. Laboratory investigations showed RA factor positive.

Imaging features

On plain radiograph: Multiple ill-defined metaphyseal lesions noted in the medullary region of femur and tibia with sheet-like central lucency

surrounded by sclerotic with a serpiginous border.

On plain CT: The lesion is noted within the metaphyseal medullary region of femur and tibia surrounded by a sclerotic rim sparing the cortex.

On MRI: T1weighted image shows geographical lesions with peripheral hypo intense and central iso intense signal. Multiple well defined, variable sized central T2 iso to hypointense and serpiginious peripheral hyperintense rim with adjacent outer hypointense halo in metaphysis of femur and tibia.

Radiograph

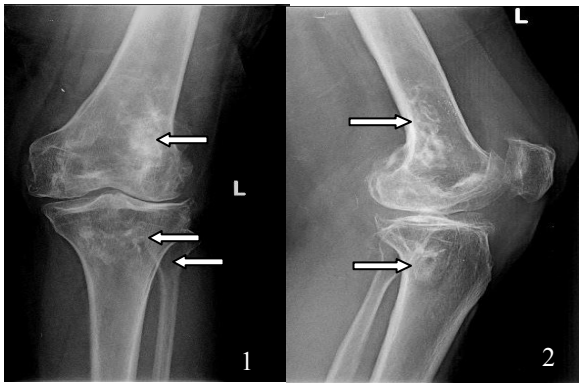

Figure 1 & 2: Radiograph AP and lateral view of knee showing multiple ill-defined metaphyseal lesions in the medullary region of femur and tibia with central lucency and surrounded by sclerosis with a serpiginous border.

Computed Tomography

Figure 3 & 4: Computed tomography scan coronal and sagittal reformatted image showing the lesion in the metaphyseal medullary region of femur and tibia surrounded by a compact rim sparing the cortex.

Magnetic Resonance Imaging

Figure 5: T1 weighted coronal MRI shows geographical lesions with peripheral hypo intense with central iso intense signal.

Figure 6: Multiple well-defined, variable sized lesions showing central T2 iso to hypointense area with serpiginious peripheral hyperintense rim and adjacent outer hypointense halo in metaphysis of femur and tibia-Double line sign.

Discussion

Bone infarct is the result of ischemia, which leads to destruction of the bony architecture, loss of function and pain.[2]

Plain radiography imaging: It is usually normal in early stages.[3] Osteonecrosis is seen as an arc-like, translucent lesion in subchondral region.

Computed tomography imaging: It is the optimal modality for follow-up of bone infarction.

Magnetic resonance imaging examination: It is the gold standard imaging for early diagnosis of bone infarction. Typical MRI findings of bone infarction is that the lesion is serpiginuous in shape with clear margins. Double line sign is the characteristic feature of this lesion on MRI - High

signal intensity in inner zone along with low signal intensity line in outer zone on T2WI. Joint effusion occur in bone infarction due to decreased venous return.

Stages

Bone infarction is divided into three stages according to Du Yu Qing et al[4] : acute, sub-acute and chronic; alternatively, Mitchel[5] divided infarct in four types: fat signal , blood signal , water signal, and fibre signal types.

No specific treatment is implicated in treating bone infarcts but mainstay of treatment is to manage the pain. However, further research is needed to establish a standard treatment. The prognosis of bone infarction is often good. Secondary infection is a less common complication and malignant transformation may occur rarely. We conclude that when clinical signs and symptoms are consistent with bone infarction, MRI examination should be carried out as soon as possible to facilitate early diagnosis and treatment.

Differential diagnosis of osteomyelitis and enchondroma should be ruled out.

- Acute osteomyelitis - Marrow oedema with soft tissue swelling. On post-contrast MRI, thick irregular peripheral enhancement seen in the metadiaphyseal region.
- Chronic osteomyelitis - Sinus, fistula, sequestrum and involucrum formation are seen.
- Enchondroma- Include typical chondroid matrix mineralization, in stipples or ring & arc calcification, distributed in metaphyseal lesion.[6] There is endosteal scalloping without cortical breach or soft tissue mass.

Occasionally bone infarcts may dedifferentiate and form tumours such as osteogenic sarcoma, angiosarcoma and fibrosarcoma of bone.[7,8,9]

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