CASE REPORT

Traumatic myositis ossificans circumscripta (MOC)

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SUMMARY

We report a case of a 29-year-old man who had been a victim of a public road accident. Four weeks later, the patient developed an isolated right thigh mass located ventrally in the distal one-third of the thigh. The mass was painful and associated with fever and inflammatory syndrome. Plain radiographs showed a bilateral calcified thickening of soft tissues with well-defined bony margins. Ultrasound objectified diffuse calcifications of soft tissues. CT scan-confirmed the diagnosis of myositis ossificans circumscripta, showing a bilateral thickening of the vastus intermedius chief of the quadriceps dotted with calcifications, extending along the femur axis. These calcifications have well-defined bony margins separated from the periosteum by a lucent zone.

BACKGROUND

Myositis ossificans circumscripta (MOC) is a pseudoinflammatory tumour originating from the skeletal muscle. It is characterised by the development of heterotopic bone tissue. It is usually located in a single muscle and generally occurs in girdles and limbs. MOC is most common in active young men. A history of trauma is reported in most cases, but MOC can also be seen in patients without previous trauma. In few cases, a history of infection, haemophilia or drug abuse is reported. The diagnosis of MOC is difficult in practice. In fact, its clinical and radiological features are not specific and can be mistaken for a malignant bone tumour, especially osteosarcoma. In cases of doubt, biopsy is needed.

CASE PRESENTATION

We report a case of a 29-year-old man who had been a victim of a public road accident.

Four weeks later, the patient developed an isolated right thigh mass located ventrally in the distal one-third of the thigh. The mass was painful and associated with fever and inflammatory syndrome. Physical examination revealed a painful mass, sensitive to pressure, firmly attached to deeper tissues. There were no motor deficits or neurological symptoms.

Laboratory tests revealed an increase of C-reactive protein.

Plain radiography showed (figure 1) a bilateral calcified thickening of soft tissues with well-defined bony margins.

Ultrasound of the right thigh (figure 2) showed diffuse calcifications of soft tissues; CT scans (figures 3 and 4) confirmed the diagnosis of MOC showing a bilateral thickening of the vastus intermedius chief of the quadriceps dotted with

calcifications, which predominate right and are extended along the femur axis. These calcifications have well-defined bony margins separated from the periosteum by a lucent zone which could be easily seen.

Medical treatment was started consisting of anti-inflammatory drugs and rest.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis is represented by malignant tumours especially osteosarcoma and rhabdomyosarcoma. Infections and calcified fibromatosis can also be difficult to distinguish from MOC in some cases.

DISCUSSION

Myositis ossificans (MO) is defined as a rare kind of self-localised benign condition of non-neoplastic heterotopic bone formation in the muscle or soft tissue.¹ MOC is usually seen in adults with the age ranging from 20 and 40 years. MOC most frequently occurs in the region where there is a high risk of injury, such as the thigh, buttock and elbow.

MO can be classified into three types: MO progressiva or fibrodysplasia progressiva; traumatic MOC; and MOC without a history of trauma.

MO progressiva results from a hereditary metabolic disorder seen in children. Traumatic MOC is seen in patients with new or chronic history of trauma. It is also frequent in sports with repetitive overuse. No specific aetiology is found in non-traumatic MOC. Yet it is more likely in patients with haemophilia or burns.²

Histologically, MO is essentially metaplasia of the intramuscular connective tissue resulting in extraosseous bone formation, without inflammation. It has a zonal organisation³:

- ▶ Peripheral, well-organised mature lamellar bone composed by mature bone.
- ▶ Intermediate osteoid region containing immature osteoid tissue and islands of cartilage.
- ▶ Central immature non-ossified cellular (fibroblasts) focus characterised by proliferative fibroblastic cells with haemorrhage and necrosis inside the muscle.

The diagnosis of MO is clinical and mainly radiological. MOC is clinically manifested as a very inflammatory, rapidly growing and painful muscular mass.

Plain radiography does not reveal any abnormality in the early stages of MO.

Calcification usually begins to become apparent within 2–6 weeks, and the lesion reaches the

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Figure 1 Plain radiographs: bilateral calcified thickening of soft tissues with well-defined bony margins.

classic well-circumscribed peripherally calcified appearance by 2 months.

Thus, radiographs repeated later may show pathognomonic circumferential calcification with a lucent centre and a radiolucent cleft (string sign) that separates the lesion from the cortex of the adjacent bone.

Over the following 4 or 6 months, they typically become smaller and denser.

The cleft between it and the subjacent bone may be difficult to see.

CT is the gold standard in characterising typical findings of MOC such as extensive muscle and perilesional oedema without bone marrow or cortical abnormalities.² Furthermore, CT appearances are similar to those of plain radiography, demonstrating mineralisation proceeding from the outer margins towards the centre. The cleft between it and the subjacent bone is usually visible.

The peripheral rim of mineralisation is usually visible within 4–6 weeks 3.

The MRI findings vary dependent on the stage of maturation and the histological pattern of the lesion. For early stage lesions, T2-weighted images show a heterogeneous localised mass with high signal intensity in the central area. As the lesion matures, the peripheral ossification becomes denser, and the T2-weighted MRI shows a hyperintense area with surrounding hypointense rim. On T1-weighted images, the lesion is isointense to the muscle and can be identified by mass effect, but it may demonstrate rim enhancement in the acute phase after contrast administration.

Figure 2 Ultrasound of soft tissues showing calcifications inside the muscles of the right thigh.

Figure 3 CT scan coronal and VR reconstructions showing bilateral thickening of the vastus intermedius chief of the quadriceps dotted with calcifications which have well-defined bony margins separated from the periosteum by a lucent zone.

The differential diagnosis can be represented by non-neoplastic pathologies⁴ (calcified fibromatosis, local infections) and especially by malignant tumours (lymphoma, osteosarcoma, rhabdomyosarcoma). The most frequent clinical misdiagnosis is tumour, especially extraskeletal osteosarcoma, which has similar clinical and pathological characteristics.

Anatomy–pathology examination is indicated in case of doubt.

Therapeutically, MO is benign and there is no compelling evidence that malignant degeneration ever occurs. As such, treatment is reserved for symptomatic lesions. Medical treatment is variable.

Figure 4 CT scan coronal and VR reconstructions showing bilateral thickening of the vastus intermedius chief of the quadriceps dotted with calcifications which have well-defined bony margins separated from the periosteum by a lucent zone.

Anti-inflammatory drugs and rest help decrease the pain and inflammation. Some studies noted good response to physical therapy, acetic acid phonophoresis or etidronate disodium therapies.⁵ Surgical treatment is recommended in case of functional limitation, nerve compression or persistent painful mass. It is recommended to avoid recurrence after heterotopic bone maturation. Surgical resection is usually curative.

Learning points

- ▶ Myositis ossificans circumscripta (MOC) is a rare disease with very suggestive CT and MRI features.
- ▶ The main difficulty is in malignant tumour mimicking lesion. In this case, well-defined bony margins and a cleft separating the lesion from the cortex of the adjacent bone are precious signs evoking MOC.

Acknowledgements Myositis ossificans circumscripta (MOC) is a pseudoinflammatory tumour originating from skeletal muscle and corresponds to an heterotopic, metaplastic, nonmalignant bone tumour. It is usually confined to a single muscle or muscle group and is ubiquitous, predominantly located in girdles and limbs. MOC is most common in active male within the second and third decade of life. It usually occurs after muscle injury such as repeated microtrauma, but it can also occur without previous trauma. In a small number of cases, possible etiologies include infections, burns, neuromuscular disorders, hemophilia (factor-IX deficiency),

tetanus, diffuse idiopathic skeletal hyperostosis, and drug abuse. Clinically and radiologically, it is difficult to distinguish this disease from soft tissue and bone malignant tumor specifically osteosarcoma so a biopsy is necessary to confirm the diagnosis in certain cases.

Contributors ML was responsible for the conception of the article, the data collection concerning the medical history of the patient, the physical examination, the interpretation of images and TM participated in the writing of the article, the literature review and the discussion of the case with similar articles.

Competing interests None declared.

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