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# Myositis Ossificans of Psoas Muscle: Magnetic Resonance Imaging Findings

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Myositis ossificans is a benign, localized, self-limiting ossifying soft tissue mass with unknown pathogenesis. It may be confused with a malignant tumor of bone or soft tissues, especially in the early stages of the disease. In this report, we present a case of myositis ossificans affecting unilateral psoas muscle, which to our knowledge is a very uncommon location. There was no history of trauma. We describe the imaging findings and clues to early diagnosis of myositis ossificans.

**Key words:** Myositis ossificans; magnetic resonance imaging; psoas muscle

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Myositis ossificans denotes a benign and frequently self-limiting process with an ossifying soft tissue mass in the skeletal muscle. In 75% of cases, a history of direct major trauma or repeated minor injuries is clearly established. However, in some patients no history of antecedent trauma is present (3). In this situation, it may be confused with, and requires differentiation from a malignant tumor of bone or soft tissues, especially in the early stages of the disease. In this report, we present a case of myositis ossificans affecting unilateral psoas muscle, which, to our knowledge, is a very uncommon location. There was no history of trauma.

## Case Report

A 31-year-old woman presented with a 4-week history of right-sided lower back pain. Her past medical history was unremarkable except for a successful delivery 3 months previously. She denied any specific trauma. The patient was afebrile and laboratory values were normal except for an elevated erythrocyte sedimentation rate. Lumbar X-ray examination did not show any pathological findings. With a presumed diagnosis of spondylo-discitis or lumbar discal pathology, MRI examination was done with a 1.5-T scanner (Sonata; Siemens, Erlangen, Germany). On coronal STIR images, the lesion was readily apparent with well-defined borders and hyperintense central

region surrounded by a hypointense rim (Fig. 1A). There was also an excessive, diffuse hyperintensity consistent with edema in the psoas muscle surrounding the lesion. Both the lesion (except for its hypointense rim) and surrounding edema showed marked enhancement after IV Gd-DTPA injection (Fig. 1B). There were no pathological signal changes or contrast enhancement of nearby intervertebral disk and vertebral bodies. These findings were thought to represent myositis ossificans, but an infection, or a sarcoma, were considered in the differential diagnosis. In order to further image the lesion with peripheral hypointense rim, a CT scan was performed with a spiral CT scanner (Prospect SX Power; G. E. Medical Systems, Milwaukee, Wisc., USA). The CT scan documented a 8 × 20 mm ellipsoid lesion with a well-demarcated ossified peripheral rim surrounding a central non-ossified region of low attenuation (Fig. 2). The diagnosis of myositis ossificans was concluded by these CT findings and conservative management was adopted. The patient's symptoms resolved 2 months later and a follow-up MRI examination was performed which showed near complete regression of the surrounding perilesional edema.

## Discussion

Myositis ossificans is a benign, localized, self-limiting ossifying soft tissue mass with unknown pathogenesis. It is characterized by non-neoplastic

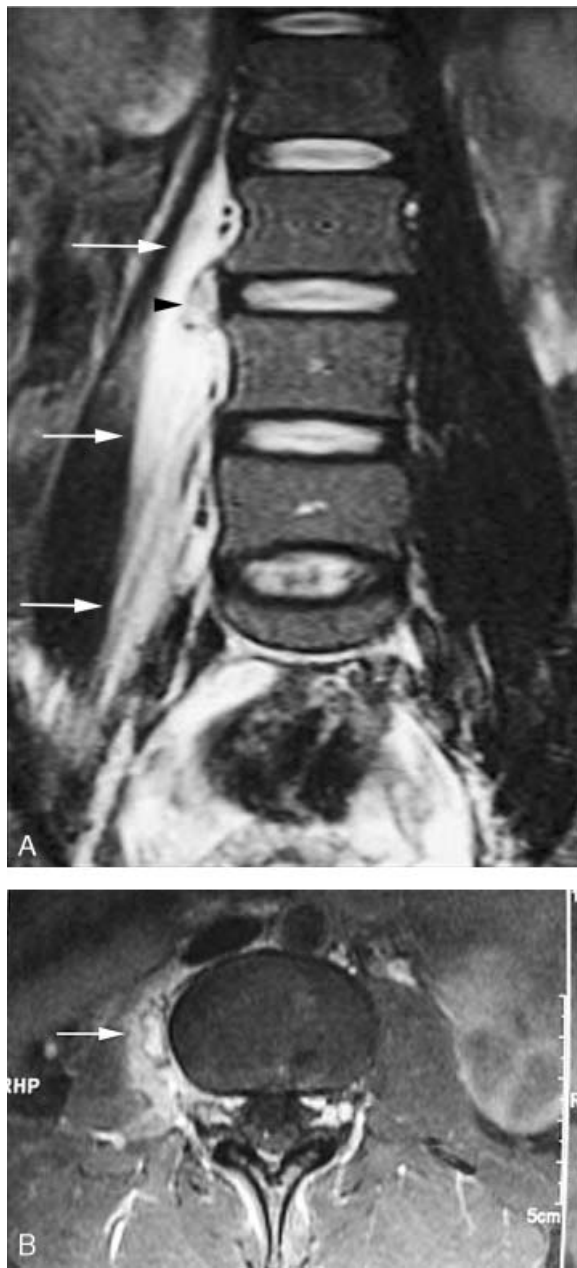


Fig. 1. MRI demonstrating myositis ossificans of the right psoas muscle located near to L3–L4 intervertebral disk. A. Coronal STIR image shows a well-demarcated hyperintense lesion with a hypointense rim (arrowhead). Note also extensive surrounding edema along the adjacent psoas muscle (arrows). B. Axial post-contrast T1-weighted image with fat saturation shows marked enhancement of the lesion and the surrounding edema. The hypointense rim of the lesion can be seen clearly (arrow).

heterotopic bone and cartilage formation in soft tissues in or adjacent to muscle and in proximity to bone. The lesion commonly affects large muscles of extremities, such as upper arm and thigh (1, 4). Pathophysiology of this disorder is thought to be posttraumatic inflammatory changes in skeletal muscle, although the exact etiology is still uncertain.



Fig. 2. CT scan obtained after MRI showing the characteristic features of myositis ossificans. Axial CT scan shows an ellipsoid mass with a peripheral ring of new bone formation (arrow) surrounding a central non-ossified region, reflecting zoning phenomenon.

During the acute inflammatory phase, the erythrocyte sedimentation rate may be elevated, as in our case, which may suggest an infection or tumor.

Radiologic findings parallel the histologic pattern of maturation. By the third week, calcification appears in the periphery of the lesion. After 4–6 weeks, the lesion shows a rim of curvilinear peripheral ossification like a shell around the lesion (characteristic zoning phenomenon). In the final healing stage, peripheral calcification progresses centrifugally to form cancellous bone. Maturation is completed in about 5–6 months (1, 4).

The most characteristic radiological findings are radiological involution and a peripheral rim-like calcification/ossification, reflecting zoning phenomenon (1, 4, 5). The diagnosis may be established by observation of the characteristic zoning phenomenon via CT scan. CT is the most sensitive imaging method for detecting heterotopic mineralization, zoning phenomenon (4, 5).

The MRI appearance of myositis ossificans also correlates with the stage of the disease (3, 4). On MRI, diffuse and sometimes extensive surrounding edema disproportionate to the central lesion is a prominent finding in the early stage of the lesions, when imaged within 8 weeks of the onset of symptoms (4). This feature is unusual for a neoplastic lesion. In the acute phase, MRI can show the lesion before the appearance of calcifications (4). Curvilinear and irregular areas of decreased signal intensity surrounding and coursing through the lesions can be seen especially in intermediate type lesions. After administration of IV Gd-DTPA, marked enhancement is seen especially in early lesions. Mature lesions are well-defined and inhomogeneous masses with a signal intensity

approximating that of fatty bone marrow on both T1 and T2-weighted images without associated edema and enhancement. On all pulse sequences, decreased signal changes related to bone trabeculae are seen surrounding and within the lesion (2, 5).

Early-intermediate myositis ossificans lesions may be confused with soft tissue sarcomas or infections especially when there is no history of trauma (3). In myositis ossificans of psoas muscle, as in our case, the main differential diagnostic considerations are sarcoma and tuberculous spondylitis with extension to psoas muscle. In addition to the lack of osseous pathological signal changes, detection of a hypointense rim around the lesion led us to regard myositis ossificans as the most likely differential diagnostic consideration.

In conclusion, although there are varying appearances of myositis ossificans related to the histologic changes as the disorder progresses, there are highly suggestive MRI findings for early detection of

myositis ossificans even in uncommon sites, as in our case. When excessive, diffuse surrounding edema suggesting inflammation around a soft tissue mass is detected, myositis ossificans should be considered among the differential diagnosis.

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