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CASE REPORT

Abdominis rectus intramuscular myositis ossificans

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Abstract Myositis ossificans (MO) is a benign, localized, and self-limiting soft tissue tumor. The condition is associated with prominent heterotrophic bone formation within the muscles, ligaments, and fascia. Clinically, MO could be confused with malignant lesions, such as osteosarcoma and soft-tissue sarcoma. Few reports have described the cytological findings and differential diagnoses of MO and malignant tumors trough diagnostic imaging. Thus, we reviewed the literature on MO. We also report the case of a 48-year-old woman with an abdominal tumor, suspected to be a sarcoma, underwent diagnostic imaging and an open biopsy, which included a histopathological examination. Thereafter, the tumor was surgically excised. Pathology reports confirmed the MO diagnosis. The patient recovered without complications. Clinical presentations along with cytological and radiological findings are helpful in diagnosing MO. Considering MO in the differential diagnosis is necessary for avoiding diagnostic pitfalls and unnecessary investigations, which can have major consequences and complications for patients.

1. Introduction

Myositis ossificans (MO) is a benign, localized, and self-limiting soft-tissue tumor and is associated with prominent heterotrophic bone formation within the muscles, ligaments, and fascia. MO usually occurs in early adulthood, most commonly in men during their second and third decades of life.[1,2] More than 50% of the MO cases are a result of trauma.[1,2] Although MO lesions can appear throughout

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the body, the lesions are predominantly located at sites most prone to injuries. The anterior muscle groups of the thighs and arms are more frequently affected than the posterior muscle groups.[2,3]

MO can be confused with malignant lesions, such as osteosarcoma and soft- tissue sarcoma. Appropriate imaging is crucial for excluding infections or malignancies. A fine-needle aspiration (FNA) and cytological examination by an experienced cytopathologist enables accurate preoperative diagnosis to rule out malignancies.

In this article, we present a rare case of a MO lesion located in the rectus abdominis muscle. In addition, we review the imaging and cytological features of the MO lesion that are useful for differential diagnosis.

2. Case report

The patient was a 48-year-old woman who experienced upper left abdominal pain for several days. The pain was dull and intermittent, with a pain score of 3/10, and was occasionally exacerbated by cough or laugh. She denied any history of systemic diseases, trauma, fever episodes, or fatigue before the onset of the abdominal pain. In recent months, she had not experienced body weight loss or appetite changes. However, she had recently discontinued birth control pills after more than 10 years of use. She first visited an oncology outpatient department of National Taiwan University Hospital and underwent abdominal computed tomography (CT), which revealed a hypervascular tumor in her left rectus abdominis muscle (Figure 1). She also underwent a tumor marker survey that included assessing levels of carcinoembryonic antigens, CA-125 and CA-199. All laboratory results were normal. The oncologist referred the patient to the plastic surgeon for further investigation. After a discussion with the patient and her family, an excisional biopsy was planned if the analysis of the frozen biopsy sample could not confirm malignancies. After 6 days, an excisional biopsy was performed as planned.

One well-delineated tumor measuring 3 $\times$ 2.8 $\times$ 2.0 cm was identified in the patient's left rectus abdominis muscle with a tan center and a firm, gritty periphery (Figure 2). The frozen biopsy of the tumor showed spindle cell proliferation in a myxoid background. Microscopically, the tumor showed zonal proliferation of fibroblasts in random intersecting fascicles and extravasation of erythrocytes in the myxoid stroma, merging with the woven bone trabeculae lined by osteocytes and osteoblasts at the periphery (Figure 3). The histopathological findings were compatible with MO diagnosis. The surgical wound healed in 2 weeks without complications and the patient recovered without incident. No muscle weakness or abdominal herniation was observed at the 1-year follow-up visit.

3. Discussion

MO is a reactive and self-limiting condition that results in heterotrophic bone formation in the muscles or soft tissues. The most common locations are the thighs, buttocks, and elbows.

MO has four clinical subtypes: (1) MO traumatica (MOT)/posttraumatic MO/MO circumscripta, (2) MO associated with paraplegia, (3) nontraumatic (pseudo-malignant) MO, and (4) MO progressiva (MOP)/fibrodysplasia ossificans progressiva (FOP).[1,4–6]

MOT is defined as a nonneoplastic proliferation of the cartilage and bone cells in an area of a muscle exposed to trauma. Three types of MOTs-periosteal, stalk, and intramuscular or disseminated-have been defined in the literature.[3,7] Periosteal MOT exhibits flat bone formation adjacent to the bone shaft, damaging the periosteum. Stalk MOT exhibits bone formation that remains attached to the bone shaft, damaging the periosteum. Intramuscular or disseminated MOT exhibits intramuscular bone formation without periosteal disruption.[3,7] The most common form of MO is MOT and is usually seen in the flexor muscle of the upper arm, quadriceps femoris muscle, and adductor muscle of the thigh in adolescent and young adults.[2,3]

MO associated with paraplegia is correlated with neurological conditions such as head and spinal injury.[4,5] Few case reports have described such MO.

Nontraumatic MO, the third type of MO, can easily be confused with malignant tumors, because of the lack of a

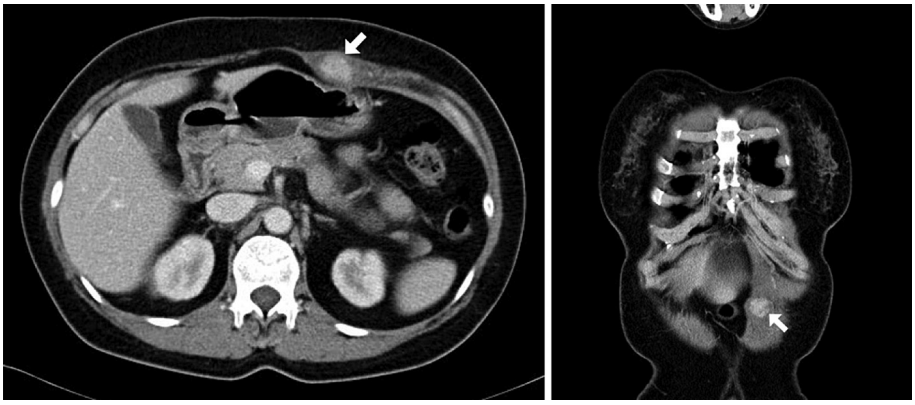

Figure 1 Computed tomography scans of the abdomen without and with IV contrast enhancement show an ill-defined enhanced lesion (approximately 2.4 cm) in the left rectus abdominis muscle. Hypervascular tumors, such as hemangiomas or other intramuscular neoplasms, were suspected.