Pseudomalignant myositis ossificans

Clinical, radiologic, and cytologic diagnosis in 5 cases

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In five cases of pseudomalignant myositis ossificans a benign diagnosis was suggested by fine-needle aspiration cytology and confirmed by radiographs and the clinical course. Hence, the need of biopsy to exclude malignancy was obviated. The symptoms rapidly resolved in all the patients. Thus, surgery may not be indicated in pseudomalignant myositis ossificans.

Myositis ossificans, i.e., the formation of nonneoplastic heterotopic bone within soft tissues is often assumed to be related to injury (Ackerman 1958). However, in one third of the cases there is no history of trauma (Paterson 1970, Zeanah and Hudson 1982). In these cases of so-called pseudomalignant osseous tumor of soft tissue (Jeffreys and Stiles 1966, Angervall and Stener 1969) or pseudomalignant myositis ossificans (Ogilvie-Harris et al. 1980), the early radiographic appearance and the rapid growth may suggest a malignant tumor, such as osteosarcoma of soft tissue. Later in the course, the lesion develops a characteristic radiographic and histologic appearance. The most prominent feature is the so-called zone phenomenon; the periphery of the lesion is composed of cancellous bone with radially arranged bone spiculae, and the center is made up of cellular connective tissue with abundant proliferating fibroblasts. A biopsy from the highly proliferating part of the lesion may be falsely diagnosed as malignant leading even to ablative surgery (Ogilvie-Harris et al. 1980)

We report 5 patients, 4 of whom were referred to our oncology center with a soft-tissue mass suspected of malignancy. Fine-needle aspiration cytology diagnosed a benign lesion in all 5 cases and in 3 myositis ossificans was suggested.

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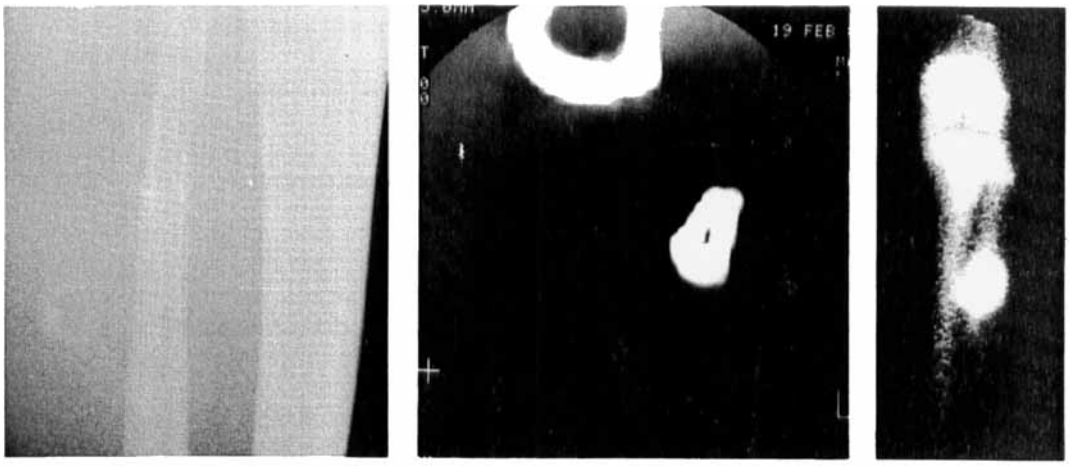
Case reports

Case 1

A 17-year-old girl was admitted because of a 5-cm firm, nontender tumor, deeply located in the lateral part of the left calf, suspected to be an osteosarcoma. She had had pain and had noted a rapidly growing tumor in the calf over a period of 1 month. There was no history of trauma. Routine blood tests were normal. Plain radiographs showed a circumscribed, faintly calcified, 4-cm soft-tissue mass posterior to the fibula (Figure 1). A computed tomogram showed a central lucent zone surrounded by a rim of calcifications. A Tc^{99}scintigram showed high uptake in the lesion. Fine-needle aspiration cytology suggested myositis ossificans. Plain radiographs 2 weeks later showed increasing calcifications at the the periphery of the tumor and lamellar periosteal bone formation at the fibula adjacent to the lesion. Six months after the onset of the symptoms, plain radiographs showed a typical myositis ossificans with mature bone throughout the lesion. The patient had no pain. One year later, she had still no symptoms, although the mass was palpable.

Case 2

A 28-year-old man was referred for a 2-cm, firm, nontender tumor fixated laterally to the left humeral head. Since first noted 1 month previously, it had grown rapidly and caused some pain. There was no history of trauma. Routine blood tests were normal. Plain radiographs showed a thin periosteal bone sleeve along the proximal lateral aspect of the humerus. Fine-needle aspiration cytology suggested a benign mesenchymal lesion. After a further 2 weeks, a 2-cm circumscribed mass with peripheral bone formation had evolved adja-



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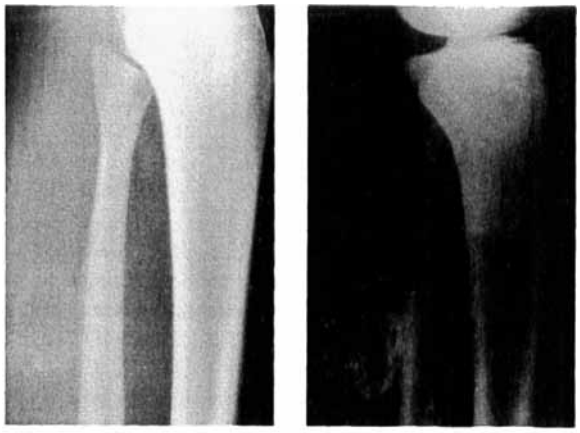


D E

Figure 1. Case 1. A 17-year-old girl presenting with a rapidly growing, slightly painful tumor in the left calf. No history of any trauma.

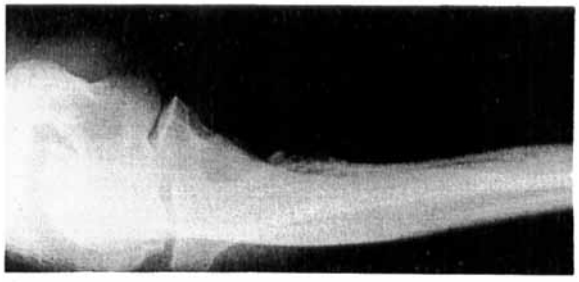
A. Plain radiograph 1 month after the onset of symptoms. Faintly outlined calcifications in the lesion.

B. Computed tomogram at the same time. A peripheral radiodense rim adjacent to the fibula.

C. Tc^{99} bone scan at the same time. Marked isotope uptake in the lesion.

D. Plain radiograph 6 weeks after the onset of symptoms. The lesion contains more consolidated bone. Periosteal bone formation in the adjacent part of the fibula.

E. Plain radiograph 6 months after the onset of symptoms. The lesion contains more consolidated bone. Perisoteal bone formation consistent with myositis ossificans.



A

B

Figure 2. Case 3. A 57-year-old man with a firm, deep-seated tumor in the volar compartment of the left forearm first observed 2 weeks before admission. No history of trauma

A. Computed tomogram 2 weeks after the onset of symptoms. A mass with a peripheral rim of calcification adjacent to the radius.

B. Plain radiograph 6 weeks after the onset of symptoms. Appearance consistent with myositis ossificans.

C

C. Plain radiograph 8 months after the onset of symptoms. Marked regression of the lesion

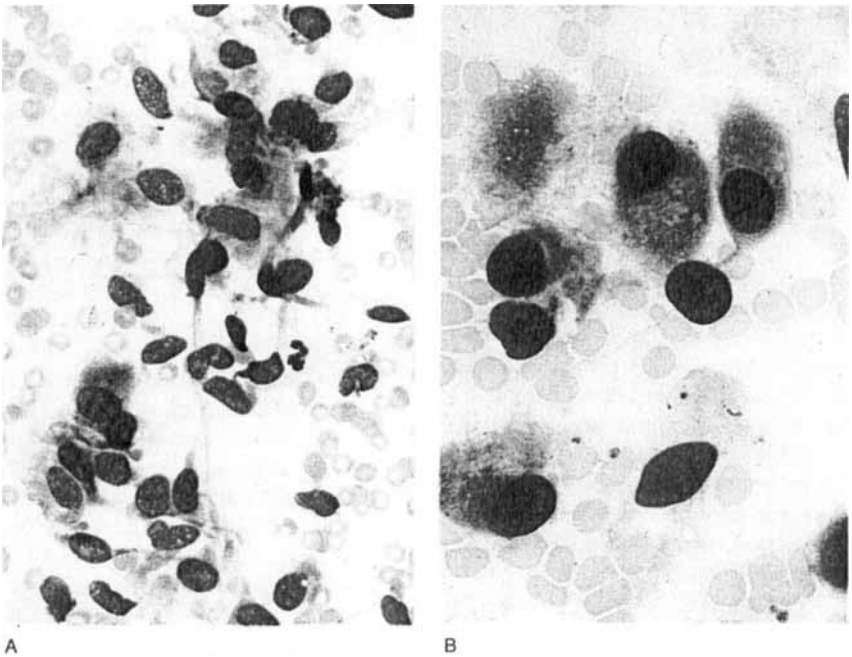


Figure 3. Two characteristic cell types in pseudomalignant myositis ossificans.

A. Cluster of proliferating fibroblasts with rounded or ovoid nuclei and elongated or polyhedral cytoplasm. Several cells are connected by slender cytoplasmic extensions. MGG, x800.

B. Osteoblasts with rounded or triangular cytoplasm, perinuclear halo, and eccentrically situated nuclei. MGG, x900.

cent to the periosteal reaction. A computed tomogram 1 month later showed consolidation of the newly formed bone. Three months after onset of the symptoms, the patient had no complaints and plain radiographs showed partial regression of the periosteal reaction. After 1 year, plain radiographs showed further regression of the tumor. There was no recurrence of symptoms.

Case 3

A 57-year-old man was referred for a deep-seated, firm, nontender, 6-cm tumor in the left forearm that had been evident for 2 weeks. There was no history of trauma. Initially, he had had mild pain that had gradually resolved. Routine blood tests were normal. A computed tomogram showed a soft-tissue mass with a peripheral rim of calcifications in the volar compartment of the forearm (Figure 2). Fine-needle aspiration cytology at the same time showed a benign reactive lesion, possibly myositis ossificans. One month later, plain radiographs showed consolidated bone consistent with myositis ossificans. After 8 months the tumor had regressed and the patient had no symptoms.

Case 4

A 15-year-old boy was admitted because of pain in the right thigh. Three weeks earlier, without trauma, he had developed progressive pain in the thigh at weight bearing. There was a tender, indurated 8 x 5-cm area on the anterior aspect of the right thigh. Straight leg raising was not possible due to pain. Routine blood tests were normal. Plain radiographs showed an extended periosteal calcification anterior to the right midfemur. A Tc^{99} scintigram showed high uptake in the corresponding region. After 6 weeks the pain had disappeared. Plain radiographs after 3 months showed a 3-cm, rounded, calcified mass anterior to the femur. Fine-needle aspiration cytology suggested a benign lesion, probably myositis ossificans. After 9 months there was an almost complete regression of the mass on plain radiographs with only a periosteal thickening of the anterior cortex of the mid-femur. The patient had no symptoms.

Case 5

A 46-year-old man was referred for a 4-cm, nontender, tumor in the left deltoid muscle. One month earlier, he had noted swelling and mild pain without any trauma. The pain disappeared after a few weeks. Routine blood tests were normal. Plain radiographs at the time of admission were normal. Radiographs 3 weeks later showed a 1 x 6 cm calcified mass with a central lucency. Fine-needle aspiration at the same time suggested a benign reactive lesion, possibly proliferative myositis. Nine months after the onset of the symptoms, plain radiographs showed regression of the calcifications. The patient had no complaints, but still had a palpable tumor.

Cytology

The aspirate smears from Cases 1–4 were similar. The smears were moderately to highly cellular with a mixture of proliferating fibroblasts, osteoblasts, multinucleated giant cells, and immature mesenchymal cells (Figure 3). They were intermingled with osteoblasts, of various shapes, with abundant cytoplasm and a more or less marked central, perinuclear, clear area and eccentrically located round nuclei. The multinucleated giant cells, which resembled osteoclasts, had an abundant, thin, finely granular cytoplasm and a varying number of rounded, uniform, regular nuclei with small nucleoli. In addition, the smears from Cases 3 and 4 contained several fragments of striated muscle. In Case 5, there were numerous ganglion-like cells, which were large, rounded or polygonal with abundant cytoplasm; and one or two nuclei with prominent nucleoli were seen besides proliferating fibroblasts, osteoblasts, and muscle fragments.

Discussion

The rapid growth of pseudomalignant myositis ossificans may indicate a malignant tumor (Ackerman 1958, Jeffreys and Stiles 1966). Radiographs during the early course may suggest an osteosarcoma or chondrosarcoma of soft tissue. Furthermore, a biopsy from the central proliferating area may offer diagnostic difficulties to the pathologist (Ogilvie-Harris et al. 1980). Because of a false diagnosis of malignancy, radiotherapy, radical local procedures, and even amputation have in several cases been considered and even performed (Ackerman 1958, Ogilvie-Harris et al. 1980). Computed tmography improves the diagnosis of myositis ossificans— with the peripheral calcific ring and the central low attenuation area being more clearly demonstrated than by plain radiographs (Amendola et al. 1983, Heiken et al. 1984).

Popok et al. (1985) described a case of myositis ossificans diagnosed in a fine-needle aspirate. Ogilvie-Harris et al. (1980), on the other hand, considered fine-needle aspiration to be contraindicated when a myositis ossificans is clinically suspected due to diagnostic difficulties of aspirates from the cellular central zone. This is not in accordance with our experience: cytologic examination of fine-needle aspirates indicated a benign lesion in all of our patients. In 4 cases the mixture of proliferating fibroblasts, osteoblasts, and osteoclast-like multinucleated giant cells suggested myositis ossificans or proliferative myositis. In Case 5 where the serial radiographs were characteristic of myositis ossificans, there were a large number of ganglion-like cells. Such cells have been found in histologic sections, as well as in cytologic smears from proliferative myositis and proliferative fasciitis (Dahl and Angervall 1977, Reif 1982), which are lesions that are considered to be closely related to myositis ossificans (Dahl and Angervall 1977).

Due to spontaneous regression of symptoms, none of our cases were operated on, and thus a histologic diagnosis was not arrived at. However, the development of each lesion on consecutive plain radiographs, the appearance on the computed tomograms, and the clinical course confirmed the diagnosis of pseudomalignant myositis ossificans. The rapid subsidence of symptoms in all the cases suggests that surgery is not indicated in pseudomalignant myositis ossificans.

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