SPIRAL CT SCAN OF THE MYOSITIS OSSIFICANS TRAUMATICA

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ABSTRACT

A demonstration of a case of myositis ossificans traumatica at right thigh by spiral CT scan was shown. The calcification at the muscle had a lacy pattern of peripheral calcification, more lucent center and there was a separation zone between the lesion and the adjacent bone. The lesion was 5 weeks old in a 9-year-old girl.

INTRODUCTION

Localized myositis ossificans is a tumor-like heterotopic formation of bone and cartilage in soft tissue, usually muscles, but also tendons, ligaments, fasciae, aponeuroses, and joint capsules (1,2,3). The mass may be doughy painful, and warm during its early development. With time, the lesion shrinks to a firm and definable mass attached to the adjacent soft tissues or bone (4). Growth of the mass occurs during this active proliferative phase and is self-limited (5). The proliferating tissue interdigitates with the muscle bundles. Eventually, the lesion develops into a mass of mature bone with a cortical shell surrounding central cancellous, less mature tissue (6).

We present a case of myositis ossificans traumatica, 5 weeks post trauma by spiral CT scan.

CASE REPORT

A 9-year-old girl was hit at her right thigh for 5 weeks. The mass has developed at right thigh at a later time. The mass was hard but not tender. Nodular fasciitis was first impressed. The mass did not increase is size but there was a progressive calcification in the soft tissue at the region of the mass on plain film.

Elscint spiral CT scan of the lesion was performed. The spiral scan used 2.5 mm beam width, 1.5 pitch, 26 seconds-total scan time, 430 mm-FOV, 120 -KV, 350 mAS/ slice. The image reconstruction was performed with 1.6 mm interval, using 512 X 512 matrix. The 3-D reconstruction technique was followings: 1) bony tissue of the femoral shaft, soft tissue of the thigh and calcified muscle were reconstructed separately using volume definition technique (the method to select tissue for 3-D surface rendering using connectivity algorithm by selecting seed pixel and setting range of Hounsfield unit to connect adjacent pixel of the same density range and compile to form a volume of tissue for rendering) 2) cut-3 D program was used to cut and displace 3-D surface rendering images and multiplanar CT images simultaneously in different cutting plane of the soft tissue, in axial, sagittal or oblique plane. The advantage of cut-3D images is the good demonstration of the relationship between the lesion and the adjacent structures in the three dimensional space.

Figure 1 showed calcification in the muscle plane, denser calcification at the peripheral portion and a calcium-free zone between the calcification and the cortex of the femur. Solid periosteal reaction is noted around the femoral cortex. Figure 2 showed 3-D reconstruction of the lesion, in relationship with the femur and the muscles.

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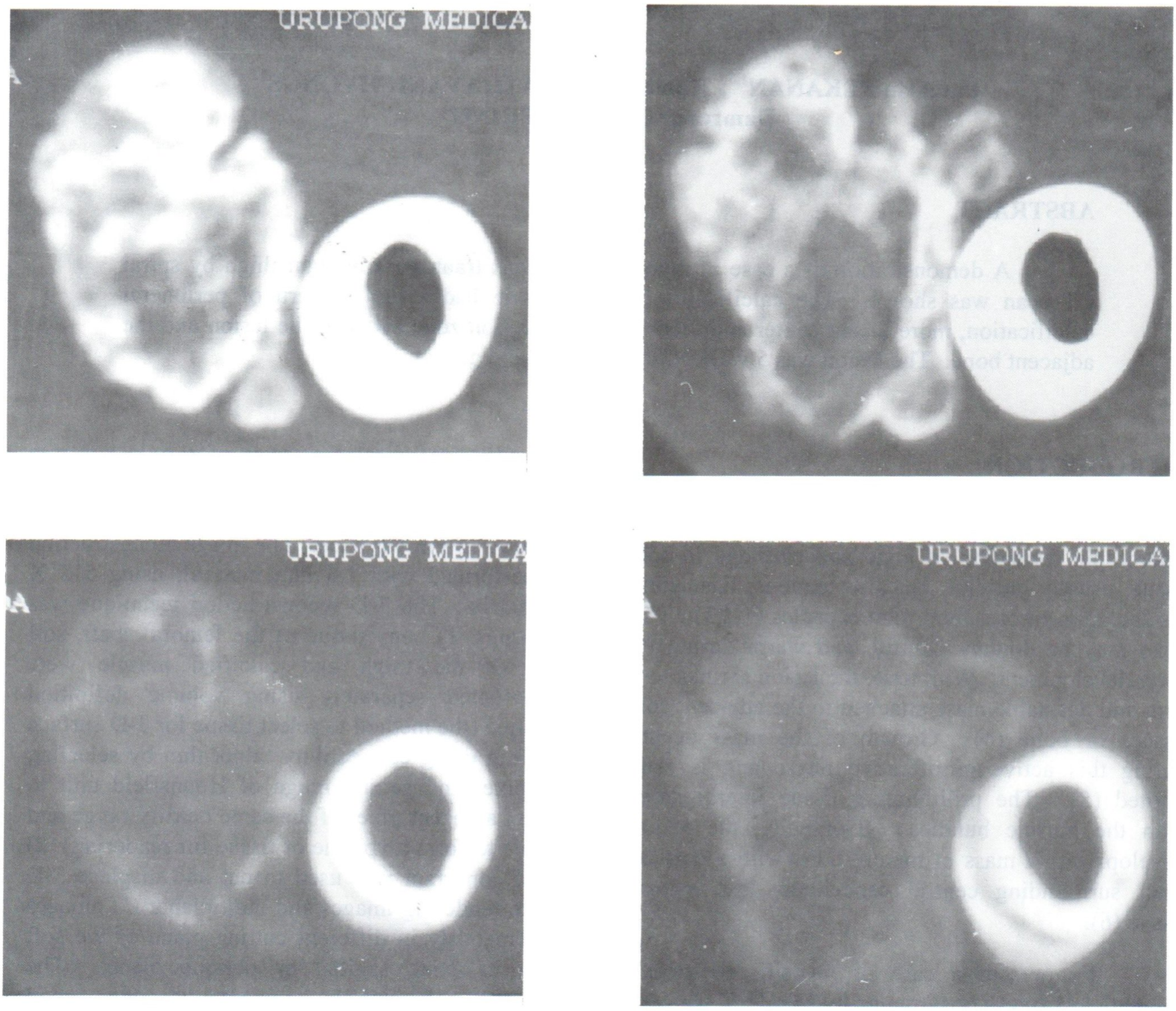

Fig. 1 Serial scans through a focus of myositis ossificans showed a well encapsulated lesion with a peripheral zone of ossification and a lucent center. The separation-zone between the lesion and the lunderlying bone was noted. Solid periosteal reaction at the adjacent femur was due to the simultaneous insult to the bone.

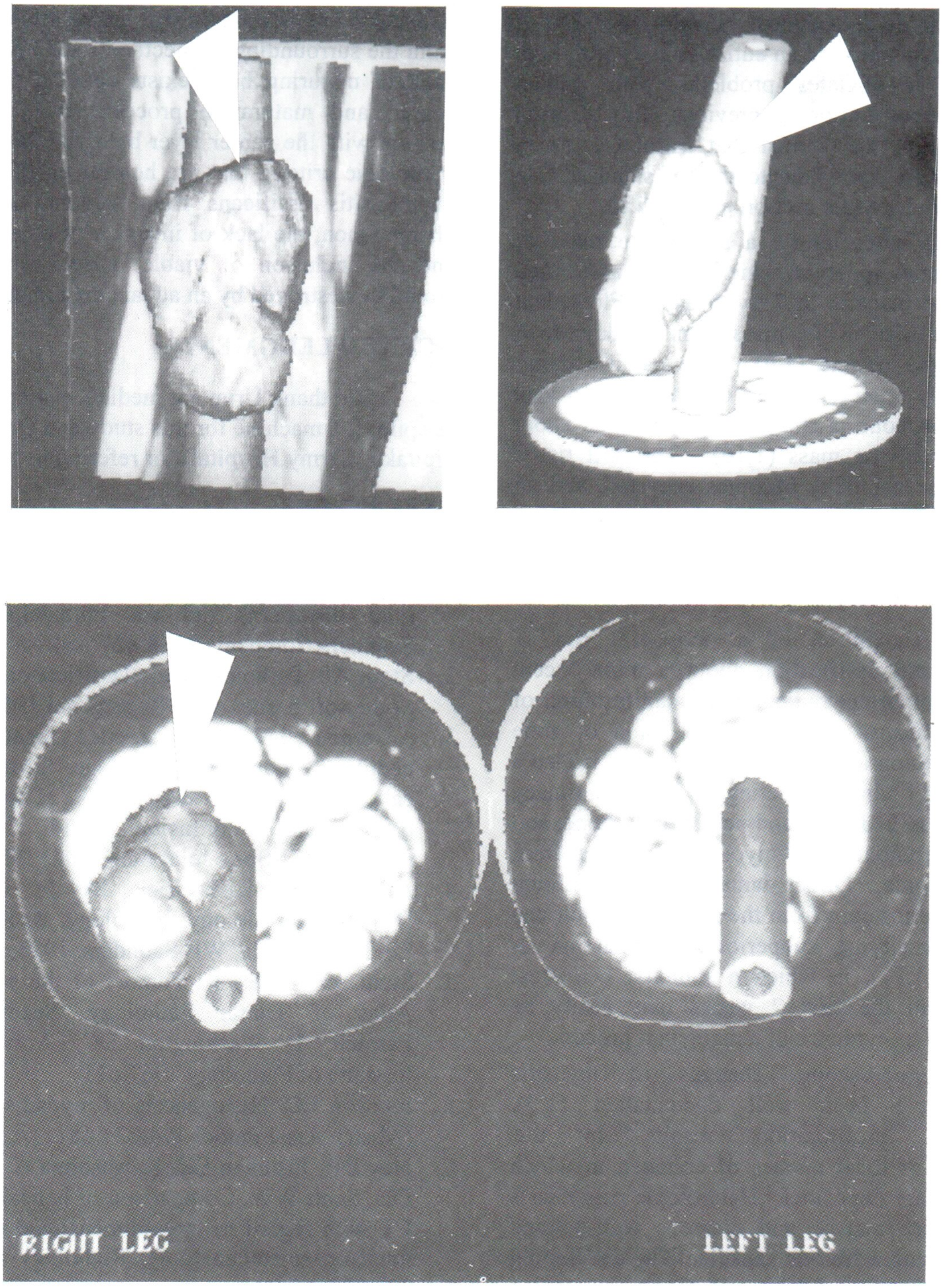

Fig. 2 3-D reconstruction of the lesion showed the relationship with the femur, muscle planes, compared with the normal leg.

DISCUSSION

Spiral CT is a potentially ideal acquisition method for three-dimensional imaging because it enables fast acquisition of an entire volume with high resolution. It obviates problems with patient movement and respiration. A previous study of spiral and standard CT has shown that spiral CT has a planar resolution equivalent to that of standard CT, lower noise, and a wider section profile (7,8).

Shortly after injury, a soft tissue mass or swelling becomes apparent, which may be associated with periosteal reaction in 7 to 10 days. Flocculent dense lesions arise in the mass from 11 days to 6 weeks after the trauma (1,9). The calcific dense areas gradually enlarge, and at 6 to 8 weeks a lacy pattern of new bone is sharply circumscribed about the periphery of the mass (1,10). The soft tissue central core occasionally becomes encysted, and an enlarging central cavity combined with peripheral calcification and ossification resembles an eggshell. Maturity is reached in 5 to 6 months, and the mass then shrinks.

The recognition of a peripheral rim of calcification and ossification about a more lucent center is an important radiographic manifestation of myositis ossificans. A radiolucent band or zone between the lesion and the subjacent cortex is also a very important finding, reflecting the lack of intimacy between the ossified mass and neighboring bone, and allowing differentiation of myositis ossificans from parosteal sarcoma. Direct damage to the cambium layer of the periosteum from the traumatic insult can lead to an ossifying subperiosteal hematoma or periosteoma (1,11), in which a sunburst periosteal reaction within the first 2 weeks may easily be misinterpreted as evidence of a malignant process.

The microscopic changes of myositis ossificans have been well documented (1,9). Mesenchymal proliferation results in the accumulation of focal masses of collagen in which calcium salts are deposited. Heterotopic osteoblasts appear, produce matrix, and create a well-defined lesion possessing a fibrous capsule. The developing lesion demonstrates three distinct zones, a phenomenon that allows differentiation from sarcomatous processes (1, 13,14). The center of the lesion contains rapidly proliferating fibroblasts with areas of hemorrhage and necrosis. A middle zone contains osteoblasts with island of immature bone. Biopsy of cellular inner and middle layers alone may result in an erroneous diagnosis of a sarcoma. It is the outer zone of the lesion that reveals the true benign nature of the process. In this region, mature trabeculae are discovered that are clearly demarcated from the surrounding connective tissue. A peripheral shell of maturing bone exists about a soft cellular center, and maturation proceeds in a centrifugal fashion with the center layer being the last to ossify. Pathologic criteria that are helpful in differentiation of myositis ossificans from sarcoma are a zone phenomenon, the lack of invasion of adjacent tissue, and the inclusion of viable muscle fibers, which would be destroyed by an advancing tumor (1,9).

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