Myositis ossificans

- Most common form of heterotopic ossification, usually within large muscles.
- Its importance stems in large part from its ability to mimic more aggressive pathological processes. Myositis ossificans is one of the skeletal “don’t touch” lesions.

- There are some conditions that are related to, or share a similar name to, myositis ossificans:
  - myositis ossificans circumscripta: refers to new bone that usually appears after trauma (see below)
  - myositis ossificans progressiva: a rare, inherited disorder characterized by fibrosis and ossification of muscles, tendons and ligaments at multiple sites that is disabling and ultimately fatal
  - panniculitis ossificans: similar to myositis ossificans but occurring in subcutaneous tissues
  - fibro-osseous pseudotumor of the digits: variant of myositis ossificans occurring in the fingers and toes
- The remainder of this article focuses on the former. Myositis ossificans progressiva, panniculitis ossificans and fibro-osseous pseudotumor of the digits are discussed separately

Definitions

- WHO classifies under fibroblastic and myofibroblastic tumors
- Heterotopic formation of bone, cartilage, and fibrosis in soft tissues; self-limiting
- HO covers all sites of involvement (muscle, fascia, tendons, fat)
- MO term used most by pathologists
- Other names by location: may also occur in tendons and fascia (fasciitis ossificans) or fat (panniculitis ossificans)

Etiology

- Most cases of myositis ossificans occur as a result of trauma
  - Thus, the primary demographic is young adults
- Another group which is especially prone to myositis ossificans are paraplegics, usually without evidence of trauma.
- Total hip arthroplasty patients at risk for local HO

Image Interpretation Pearls

- Do not overinterpret early amorphous mineralization/osteoid formation as tumor bone: assess for zonal organization
- If considering early HO diagnosis → obtain CT or short-interval follow-up radiographs (3-4 weeks)
- Periosteal reaction &/or cortical, marrow, and soft tissue edema commonly associated with HO
- Unfortunately, the histology of myositis ossificans can appear like osteosarcoma, and thus, can lead to inappropriate management.

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Natural progression of HO is shown. Coronal graphic shows the earliest appearance. There is a doughy mass →, which distorts the subcutaneous fat plane. Edema is present in the subcutaneous tissues ⇔, but the adjacent bone is normal.

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HO at 3-4 weeks is shown. The mass is slightly smaller, and the subcutaneous edema ⇔ has resolved. However, there is new development of periosteal reaction and cortical edema ⇔. This is the stage at which HO may be most confusing on imaging.

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HO at 6-8 weeks is shown. There is now newly organized mature bone developing peripherally about the lesion →.

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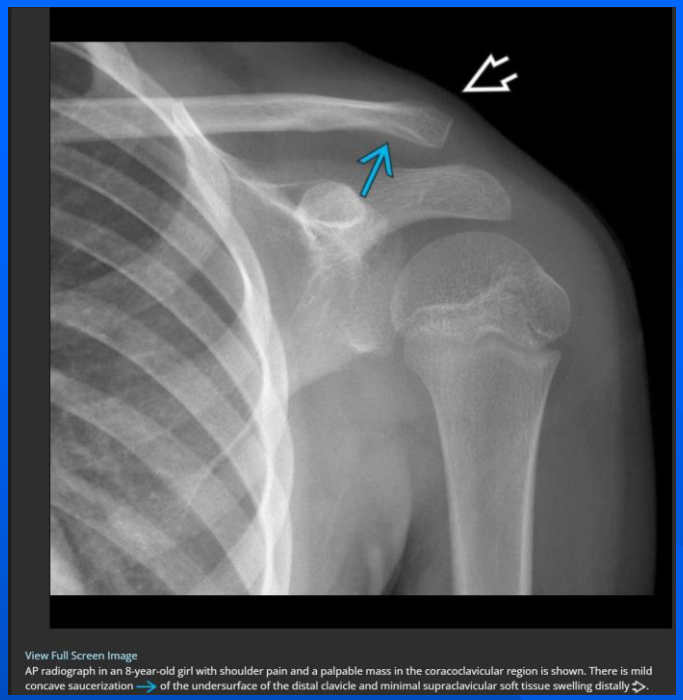
HO at 5-6 months is shown. By this time, the peripheral bone is clearly mature →. There may be trabeculae within the lesion, but the lesion generally retains a less mature appearance centrally, particularly on axial imaging. There is no surrounding soft tissue mass. The entire lesion often begins to decrease in size.



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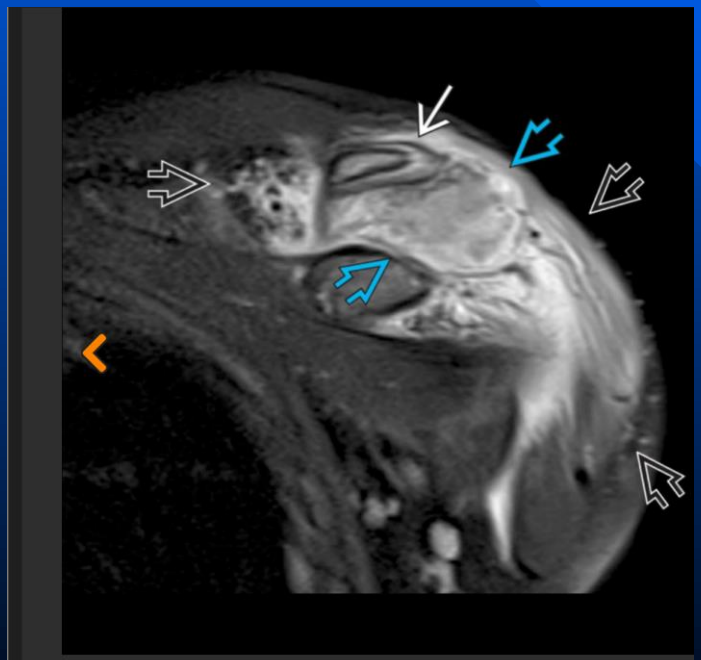
AP radiograph in an 8-year-old girl with shoulder pain and a palpable mass in the coracoclavicular region is shown. There is mild concave saucerization of the undersurface of the distal clavicle and minimal supraclavicular soft tissue swelling distally.



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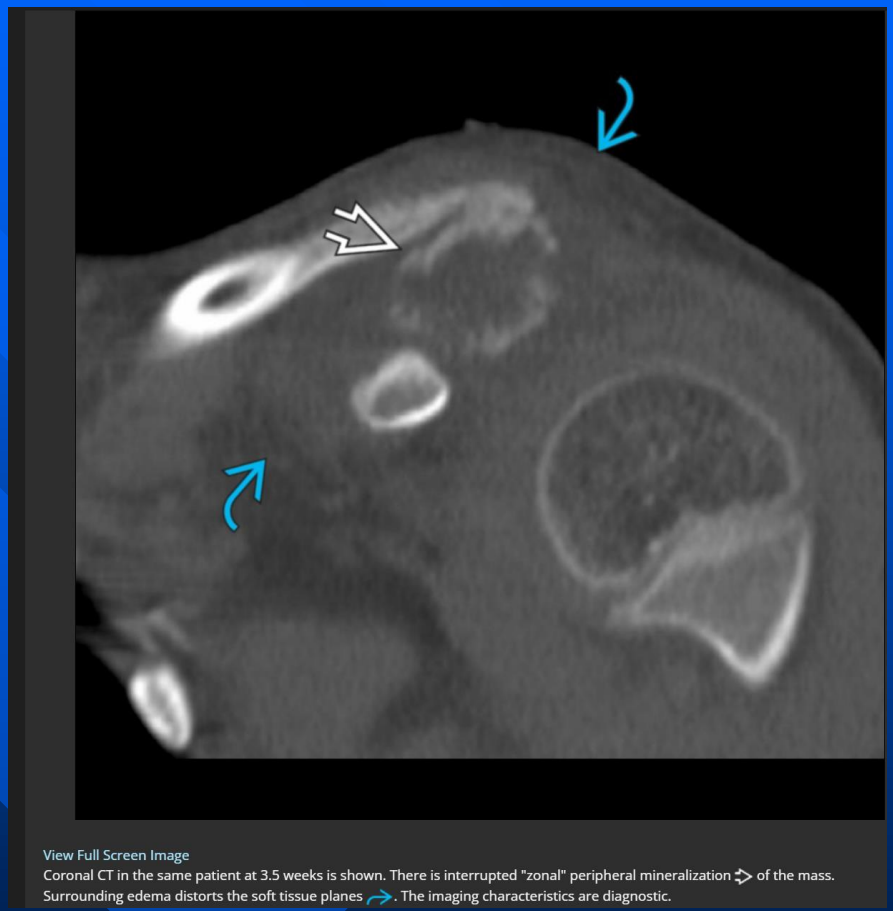
Coronal T2 FS MR in the same patient at 2.5 weeks shows a poorly defined, ovoid, heterogeneous hyperintense mass with marked surrounding edema. Periosteal reaction surrounds the distal clavicle.



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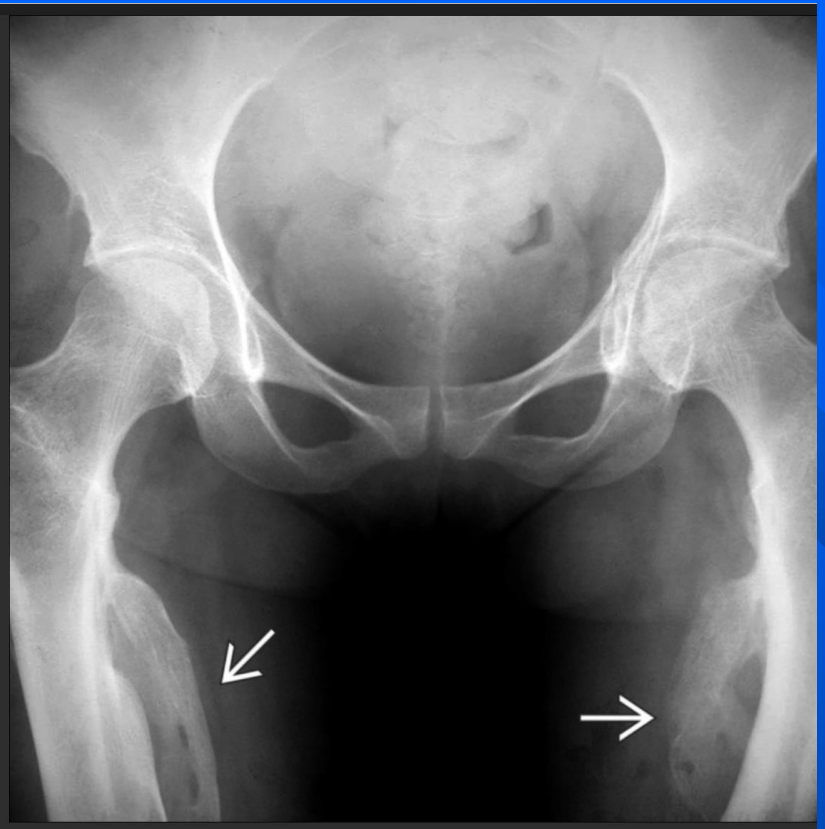
Coronal CT in the same patient at 3.5 weeks is shown. There is interrupted "zonal" peripheral mineralization of the mass. Surrounding edema distorts the soft tissue planes. The imaging characteristics are diagnostic.



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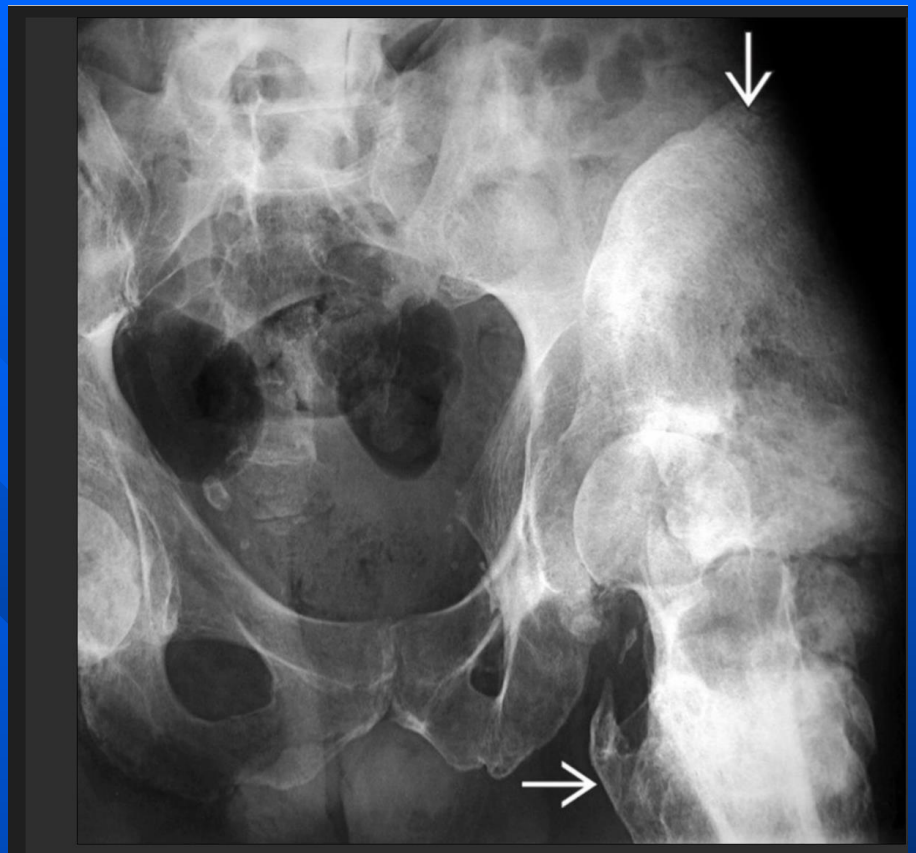
AP radiograph shows mature HO within the adductor muscles bilaterally →. Maturity is judged by the development of peripheral cortex and central trabeculae. This patient is an avid horseback rider.



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AP radiograph in a paraplegic patient shows abundant mature bridging HO from the left hemipelvis to the proximal femur →; extensive HO, such as this, may develop from neurologic injury.

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AP radiograph may be alarming with lamellated periosteal reaction and faint osseous matrix in the soft tissues. This appearance could represent either early myositis ossificans or early surface osteosarcoma.

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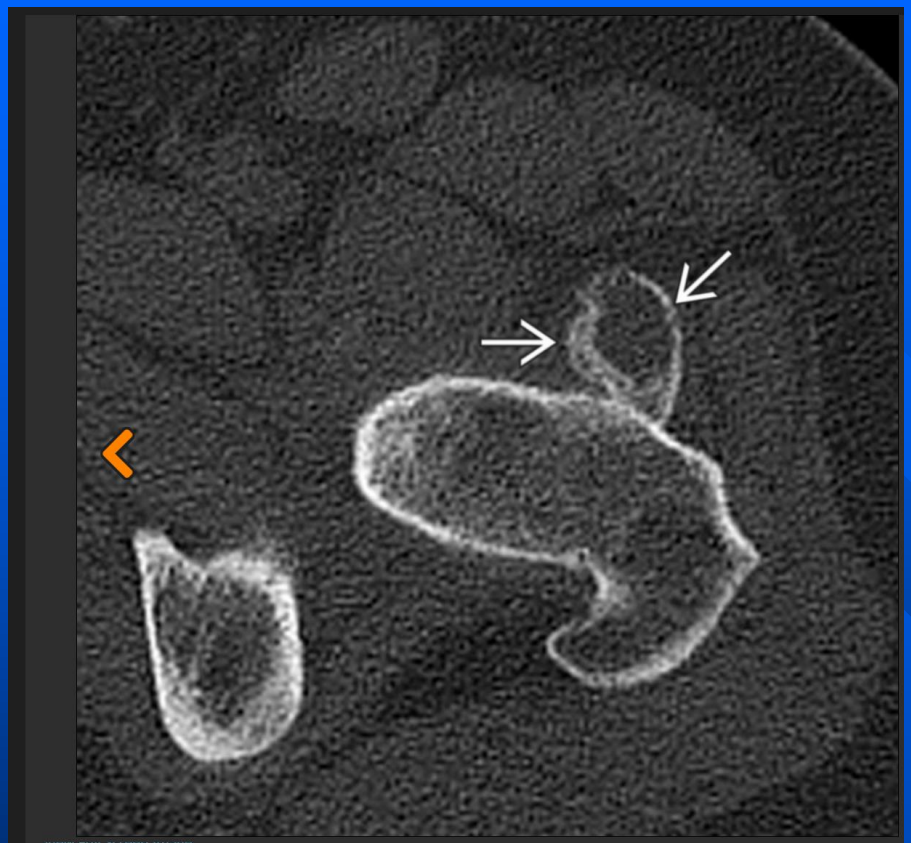
Coronal T2 FS MR in the same patient shows a halo of low signal with central and surrounding high T2 signal. This is a representation of the zonal phenomenon in early HO. This should prompt short-interval radiographs instead of biopsy.



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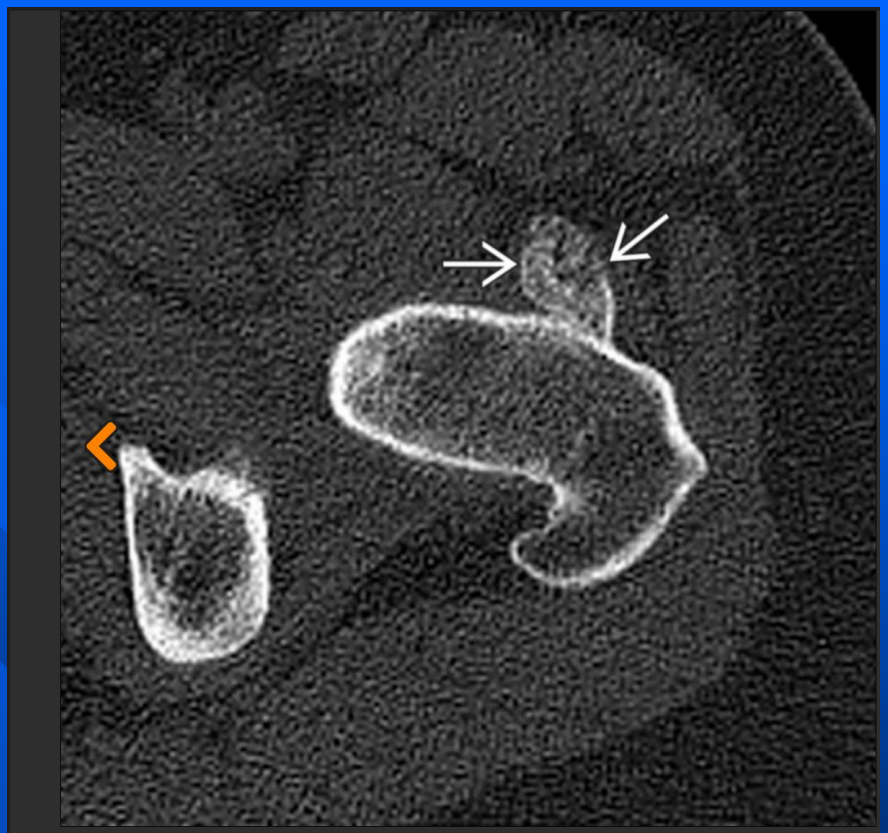
Axial CT through the proximal femur of a 30-year-old shows well-defined bone matrix → peripherally, surrounding a hypodense center. This zonal pattern is typical of HO and is the opposite of parosteal osteosarcoma (central ossific density, peripheral soft tissue). In this case, the CT was obtained 22 weeks following trauma.



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Axial CT in the same patient, but obtained 20 weeks later, is shown. The lesion → has decreased in size while retaining the benign HO zoning.

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