

MR-guided Interventions of the Musculoskeletal System in Children and Adults: Pertinent Principles and Spectrum of Clinical Applications

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Purpose

1. To review the pertinent principles of interventional MR imaging relevant to musculoskeletal procedures.
2. To discuss indications, advantages, and drawbacks of interventional MR imaging of the musculoskeletal system.
3. To illustrate minimally invasive, MR-guided techniques for percutaneous procedures of the musculoskeletal system.

Outline of Content

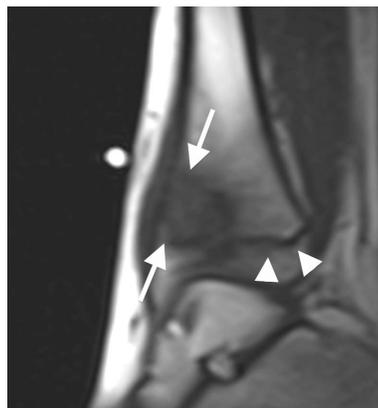
- Basic principles of interventional MR imaging, including suitable pulse sequences for accurate device visualization, MR fluoroscopy and MR-compatible devices, such as drills, injection needles and coaxial biopsy systems.
- General and specific indications and contraindications, advantages, and drawbacks of a variety of MR-guided procedures of the musculoskeletal system.
- Description of techniques and illustrative case examples, including diagnostic osseous biopsy; therapeutic osseous interventions such as retrograde drilling of osteochondritis dissecans, ablation of osteoid osteoma, and drill-assisted resection of physeal bone bridge; soft tissue biopsy; preoperative percutaneous tumor marking; and injection procedures such as selective spinal nerve injections, epidural injections, facet joint injections, sacroiliac joint injections, discography, sympathetic blocks, and temporomandibular joint injections.

Summary

1. MR-guided percutaneous techniques are useful for a variety of diagnostic and therapeutic musculoskeletal procedures.
2. These techniques are especially suited for complex and deeply situated targets that are difficult to visualize with other imaging modalities and for procedures in children and adolescent, in which radiation exposure should be avoided.
3. MRI guidance favorably combines direct visualization of targets, objective assessment of the location of biopsy devices, visualization of the distribution of injectants and the absence of ionizing radiation.



12 year-old girl with lytic lesion in distal tibia (arrows) adjacent to physis.



T1-weighted MR image shows lesion (arrows) near endplate (arrowheads). Skin marker indicates drill entry point.



MR-guided drill biopsy (arrow) of the lesion. Note drill sparing the physis (arrowheads).
Pathological diagnosis: Aseptic osteomyelitis