Accuracy of MR Imaging in Detection of Pedal Osteomyelitis in the Postoperative Patient

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Summary:
The diagnosis of osteomyelitis is difficult, particularly in patients with diabetic pedal disease, especially following surgical procedures. In this study we investigated the accuracy of contrast enhanced MR imaging in the diagnosis of osteomyelitis in 88 feet of 78 patients who had prior surgery. Sensitivity of MR imaging overall was 96%; specificity was 87%; PPV was 97%; NPV was 81%. Among diabetics, sensitivity was 96%; specificity was 93%; PPV was 98%; NPV was 87%. We conclude that contrast enhanced MRI is accurate for the diagnosis of post-operative osteomyelitis, even in diabetic patients.

Purpose:
The diagnosis of osteomyelitis in feet has been historically difficult particularly in patients with diabetic pedal disease. Recent work using MR, especially with contrast enhancement, has shown high accuracy for the diagnosis of pedal osteomyelitis if specific imaging signs are utilized (1). In most parts of the musculoskeletal system the post-operative patient creates additional diagnostic difficulties. Postoperative changes may produce an edema pattern and contrast enhancement similar to imaging signs of osteomyelitis (2-4). Diabetic patients commonly suffer from surgical procedures to the foot due to their predisposition to peripheral arterial disease, peripheral neuropathy, and susceptibility to infection. In patients with potential post-operative infection there is tremendous clinical importance in the accurate diagnosis of potential osteomyelitis. Proper early diagnosis and management may permit conservative, limb-sparing treatment, and prevent a subsequent surgical procedure. Consequently, we sought to evaluate the accuracy of contrast enhanced MR imaging in diagnosis of osteomyelitis in postoperative patients.

Methods:
Initially, we studied the records for 139 feet in 116 patients who underwent prior surgery to the foot and had MR imaging performed at our institution between 1993 and 2002 due to clinical suspicion of osteomyelitis. Prior surgeries included local debridement, amputation, and revascularization procedures. Only patients with histopathologic or microbiologic analysis performed subsequent to MR imaging were included in the study group, which consisted of 88 feet in 78 patients. MR imaging was performed at 1.5-T (Signa; GE Medical Systems, Milwaukee, Wis) using gadolinium enhancement. MR imaging criteria for the diagnosis of postoperative osteomyelitis included marrow edema and enhancement and adjacent soft tissue inflammation and collections. Two authors reviewed the medical records of all 78 patients to identify comorbid disease and document osteomyelitis using the following criteria: positive microbiologic or histopathologic evidence of infection of bone obtained via open or percutaneous biopsy, or positive blood culture. The sensitivity, specificity, positive predictive value, and negative predictive value were calculated for the overall study group and for patients previously diagnosed with diabetes mellitus.

Results:
Of the 78 patients, 56 had diabetes mellitus. Infection was confirmed in 73 feet, most with Staphylococcus species (48/73, 66%) or polymicrobial infection (30/73, 41%). Overall the 73 feet had infection involving 93 sites, including a digit (n=22), a metatarsal (n=36), the midfoot (n=6), the hindfoot (n=17), and the ankle (n=12). Sensitivity of contrast enhanced MRI in diagnosis of osteomyelitis overall was 96%; specificity was 87%; positive predictive value was 97%; negative predictive value was 81%. Among diabetics, sensitivity was 96%; specificity was 93%; positive predictive value was 98%; negative predictive value was 87%.

Conclusion:
Contrast enhanced MRI is surprisingly accurate for the diagnosis of recurrent post-operative osteomyelitis, even in diabetic patients.

References: