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Diagnosis of osteomyelitis superimposed on Charcot osteoarthropathy: value of bone scan, labeled leucocyte scan and MRI

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Introduction-Aim: In the presence of Charcot osteoarthropathy, clinical and radiographic identification of osteomyelitis (OM) is difficult. The aim of the study was to evaluate the value of three phase ^{99m}Tc-MDP-bone scan (BS), ^{99m}Tc-HMPAO-labeled leucocyte scan (LS) and MRI for diagnosing OM superimposed on Charcot osteoarthropathy in diabetics. **Patients and methods:** Forty four diabetic patients with radiographically confirmed Charcot joints (5 bilateral) and clinical suspicion of mid/hind foot OM were included in the study. 26 pts had a concomitant plantar ulcer. All pts underwent BS and LS of the feet. 17 pts also underwent MRI. Focal increased blood flow, hyperemia and increased bone uptake on BS was suggestive of OM. LS images indicated OM when focally increased leucocyte uptake at the site of suspected bone infection was greater than surrounding soft tissue and bone uptake. When LS were interpreted together with BS, spatially congruent BS/LS findings indicated OM. MRI findings compatible with OM were low signal intensity on T1-weighted images combined with high signal intensity on T2- weighted images. Final diagnosis was based on clinical and radiological/scintigraphic follow-up or bone biopsy. **Results:** Among the 49 Charcot feet investigated, 15 foci of OM, 11 cases of acute Charcot arthropathy and 23 uninfected Charcot joints were finally diagnosed. 10/15 pts with OM (66.7%) had a concomitant pedal ulcer. BS was sensitive (100%), but not specific (20.8%) for diagnosing OM superimposed on Charcot foot. The accuracy of BS was only 50%. Sensitivity, specificity, accuracy, positive (PPV) and negative predictive value (NPV) of MRI were 100%, 62.5 %, 82.3 %, 75% and 100% respectively. Sensitivity, specificity, accuracy, PPV and NPV of LS alone for diagnosing OM superimposed on Charcot joint were all high: 92.3%, 96.3 %, 95%, 92.3 % and 96.3% respectively, not further improved with the addition of BS. There was only 1 false positive LS result due to abnormal leucocyte uptake at sites of active bone marrow in acute Charcot joint and not OM. **Conclusion**: BS is not useful in the diagnosis of OM superimposed on Charcot joint. MRI is extremely sensitive but not enough specific in this clinical setting. LS although slightly less sensitive than MRI (92.3% vs 100%) is considerably more specific (96.3% vs 62.5%) for diagnosing OM superimposed on Charcot arthropathy. With an accuracy of 95%, LS is the most effective imaging modality for determining whether infection is present in a Charcot joint.