

Remote areas of bone marrow oedema identified by magnetic resonance imaging in feet of subjects with diabetes presenting with neuropathic lesions are common but do not predict future Charcot neuroarthropathy

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Background and aims: Charcot neuroarthropathy may involve a subclinical phase characterised by bone marrow oedema on MRI without the classical clinical signs. We assessed the prevalence of remote areas of bone marrow oedema on MRI of feet of subjects with diabetes presenting with neuropathic foot ulceration, in whom MRI had been used to assess for underlying osteomyelitis. **Subjects and methods:** MRI scans performed over 6 years to look for osteomyelitis were assessed by two independent radiologists. Diagnostic criteria for osteomyelitis were hyperintense signal on T2 weighted images of bone in continuity with abnormal high signal in the surrounding soft tissues which lead to the abnormal skin and subdermal area of the ulcer. Remote areas of hyperintensity in bone were recorded and then correlated with subsequent clinical outcome. **Results:** 70 MRI studies of feet with ulcers in 66 subjects with diabetes were assessed; both feet had been assessed in 4 subjects. Of the 66 subjects (mean (standard deviation) age 64 (13) years; duration of diabetes 21 (14) years; HbA1c 8.6 (2.1) %; 48 (73%) male; 8 (12%) with Type 1 diabetes; 13 (20%) on renal replacement therapy), all had a peripheral neuropathy. Of the 70 neuropathic lesions (66 forefoot and 4 hindfoot), 54 (77%) healed without any form of amputation. Osteomyelitis underlying the neuropathic lesion was present in 48 (69%). Remote areas of hyperintensity in bone were present in 21 studies (30%) (5 without and 16 with concurrent osteomyelitis); in 20, the neuropathic lesion had involved the forefoot and the remote areas of hyperintensity involved the forefoot in 1 study, the midfoot in 14, the hindfoot in 3 and the midfoot and hindfoot in 2; in 1 study, the neuropathic lesion had involved the hindfoot and the remote area of hyperintensity also involved the hindfoot. Subjects with remote areas of hyperintensity were younger (56 (13) vs. 67 (12) years; unpaired t-test $p < 0.001$), were more likely to require renal replacement therapy (43% vs. 9%; Fisher's exact test $p = 0.002$) and were non-significantly more likely to have Type 1 diabetes (24% vs. 7%; $p = 0.098$). Mean duration of follow-up post-MRI was 17 (14) months. Charcot neuroarthropathy subsequently developed in only 1 of the 70 feet studied; remote areas of hyperintensity had not been identified on the index MRI. **Conclusion:** Remote areas of hyperintensity on MRI consistent with bone marrow oedema are common but do not predict future clinical Charcot neuroarthropathy.