

**Semiquantitative MRI bone marrow oedema and fracture scores - a novel method to assess the resolution of the acute Charcot foot**ME Edmonds<sup>1</sup>, D Elias<sup>2</sup>, L Meacock<sup>2</sup>, NL Petrova<sup>1</sup><sup>1</sup>Diabetic Foot Clinic and <sup>2</sup>Department of Radiology, King's College Hospital, London, UK

**Introduction and aims:** The MRI findings of acute Charcot osteoarthropathy consist of extensive bone marrow oedema (BMO) and fractures. The aim of this study was: firstly, to devise a semi-quantitative BMO score and fracture score on non-contrast foot and ankle MRI in patients presenting with acute Charcot osteoarthropathy and secondly, to assess prospectively the usefulness of these scores in determining clinical resolution.

**Patients and methods:** We studied 35 consecutive patients who presented to a single centre with acute Charcot osteoarthropathy. All patients were treated with casting therapy and had MR imaging at presentation and at the time of clinical resolution (defined as skin foot temperature difference of less than 2 °C at two consecutive monthly visits) or after 12 months. A scoring proforma was devised in collaboration with two musculoskeletal radiologists. Initially, the MRI scans at presentation and at clinical resolution were subjectively assessed to identify overall improvement or progression of disease. For the semiquantitative MRI score all foot bones (phalanges 1-5, medial and lateral sesamoids, metatarsals 1-5, tarsal bones, distal tibial plafond, medial and lateral malleoli) were scored individually for the extent of oedema (BMO score: 0- no oedema; 1-oedema<50% of bone volume ; 2-oedema>50% of bone volume) and for the presence of fracture (fracture score: 0- no fracture; 1- fracture; 2- collapse/ fragmentation). The total BMO and fracture scores were compared at presentation and at resolution.

**Results:** The overall score indicated improvement in 28 cases (group 1) and no improvement in 7 cases (group 2). The BMO score significantly reduced from 20±6.8 to 11±4.8 in group 1 ( $p<0.001$ ) but remained unchanged in group 2 (from 11±7.2 to 12±6.2,  $p>0.05$ ). Similarly, the fracture score significantly reduced from 9±4.9 to 8±5.3 ( $p=0.006$ ) in group 1 but remained unchanged in group 2 (from 3±4.9 to 3±4.1,  $p>0.05$ ).

**Conclusion:** This study indicates that semiquantitative MRI scoring for BMO and fracture may be a useful method to assess the degree of healing of the acute Charcot foot and could become a novel diagnostic tool to monitor treatment and assess outcome.