

The advantages of SPECT CT imaging in demonstrating the early bone and joint pathologies in patients with Charcot foot

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The aim of this study was to investigate the early Charcot foot by means of single photon emission computed tomography (SPECT) followed by CT imaging described as SPECT/ CT and to ascertain the earliest changes by this new technique of nuclear medicine.

We studied 11 patients who presented with intact red swollen foot. Foot and ankle radiographs at presentation did not reveal structural bone and joint damage. All patients had a technetium diphosphonate bone scan with conventional planar views but also with SPECT followed by CT imaging of the feet and ankles. Hybrid images in which the SPECT bone scan was fused with CT imaging were constructed. This enabled accurate localisation on CT of the radionuclide uptake seen on SPECT imaging.

There was increased focal radionuclide uptake on the third phase of the bone scan in all patients. This was seen on conventional planar views and also on SPECT images. Correlation of these sites of increased uptake with the CT scans demonstrated the following pathologies: Increased uptake in distal tibia in bone scan correlated with tibial fracture on CT (1); increased uptake in lateral malleolus correlated with avulsion malleolar fracture (1); increased uptake in the talus (3) correlated with subchondral fracture (1), patchy lucency of talar dome (2); increased uptake in the talo-calcaneal joint correlated with loss of joint space (2); increased uptake in the 2nd tarso- metatarsal joint (TMTJ) correlated with loss of 2nd metatarsal /cuneiform joint space (1); increased uptake in the 5th TMTJ correlated with loss of joint space, bony fragmentation and subchondral cysts at the 5<sup>th</sup> TMTJ (1); increased uptake in the 1<sup>st</sup> TMTJ correlated with loss of joint space at the 1<sup>st</sup> TMTJ (1); increased uptake in the 4<sup>th</sup> metatarsal head correlated with a fracture of the 4<sup>th</sup> metatarsal head (1).

In conclusion, this new technique of SPECT/CT of the early Charcot foot has allowed accurate localisation and characterisation of areas of increased radionuclide uptake and demonstrated early bony and joint changes of the Charcot foot thus facilitating accurate diagnosis and rapid treatment.