

A new natural history of Charcot foot: clinical evolution and final outcome of Stage 0 Charcot's Neuroarthropathy in a tertiary care foot clinic.

F-18 FDG PET/TC scan: a useful tool in diagnosis and follow-up of acute Charcot foot.
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Background: The physiopathology of Charcot neuro-osteoarthropathy (CNO) is still not understood. The acute phase is often misdiagnosed. Rapid diagnosis and early intervention is important to prevent destructive Charcot deformity of the foot. The aim of this study is to show the role of F-18 FDG PET/CT scan in diagnosis and follow up of stage 0 CNO and to describe the natural history of an enigmatic disease through this new imaging modality. **Patients and methods:** Out of 40 diabetic patients with an acute onset of swelling, redness and warmth of the foot, we selected 25 patients without any bone involvement at standard X-ray (stage 0). The diagnosis of early acute CNO was made using clinical signs and associated skin temperature difference between the affected foot and the controlateral one (ΔT). The diagnosis was confirmed by imaging. All patients underwent x-ray, MRI and F-18 FDG PET/CT scan of both feet at baseline (T0). Standardized Uptake Value (SUVmax) was utilized as quantitative parameter of the F-18 FDG PET/CT scan. All patients underwent a new F-18 FDG PET/CT within 1 month the skin ΔT was below 2°C (clinical recovery: T1) and again each three months until SUV was lower than 2 (final recovery: T2); at this time an MRI was performed to confirm the end of inflammatory condition. **Results:** The average ΔT at T0 was $3,04 \pm 1,65^{\circ}\text{C}$. At T0, SUV max was $3,83 \pm 1,087$ at the affected foot and it was significantly higher than the correspondent area of the controlateral one ($1,24 \pm 0,3$) ($p < 0,001$). All patients were treated with serial total contact casts. The average time of casting at T1 was $7,12 \pm 3,04$ months. At this stage, the inflammatory signs were no longer present, there was a drop of the skin temperature (T0 vs T1 ΔT was $3,04 \pm 1,65^{\circ}\text{C}$ vs $0,9 \pm 0,55^{\circ}\text{C}$) ($p < 0,0001$). At T1, however, the SUV max was still unchanged from T0 ($3,80 \pm 1,69$ vs $3,83 \pm 1,09$) ($p = \text{ns}$). The average time to observe a reduction of the SUV at T2 was longer ($15,12 \pm 5,45$ mo) than the time required to observe the drop of ΔT at T1 ($7,12 \pm 3,04$ mo) ($p < 0,0001$). At T2 the final ΔT was $0,74 \pm 0,29$ (not different from the T1 ΔT) while there was a drop in the SUVmax ($3,8 \pm 1,69$ vs $1,72 \pm 0,52$) ($p < 0,0001$). **Conclusion:** Our study shows that clinical criteria, currently used to establish the recovery from the acute phase of the CNO, could be misleading because they are insufficient to establish when the inflammatory process is completely over. On the contrary PET/CT scan allows to quantify the amount of inflammatory process and is useful to establish when the acute stage is settled and when weight-bearing may be re-allowed.