

[18F]-fluoride PET/CT analyses of post-operative bone mineralization adjacent to femoral stems at THA. A randomised clinical study.

Dimitrios Sotiriou^{1,2,3}, Jens Sörensen^{2,4}, Gösta Ullmark^{1,2,3}

¹ Ortoped klinik Gävle, ² Uppsala Universitet, ³ Centrum för Forskning och Utveckling Region Gävleborg, ⁴ Nuklearmedicin klinik Akademiska

ABSTRACT

PURPOSE

Long-term success of total hip arthroplasty (THA) is dependent on support from the periprosthetic bone bed. We present a randomized study using 18F-fluoride Positron Emission Tomography/Computerized Tomography (F-PET/CT) to analyze bone metabolism in periprosthetic bone adjacent to femoral stems following THA surgery. To compare bone metabolism to cemented Exeter and uncemented SP-CL stems, patients with hip osteoarthritis were randomly assigned for THA with either cemented or uncemented THA femoral components. The results were analyzed with F-PET/CT.

PATIENTS AND METHODS

In 28 patients (28 cases) with hip osteoarthritis, a THA was performed. The patients received either an uncemented femoral stem or a cemented one. The contralateral healthy femur was used as reference (Ref) for normal bone metabolism. The patients were analyzed with clinical score, radiography and F-PET/CT at 4, 16 and 36 weeks postoperatively. PET results were analyzed and presented in 13 regions of interest (ROI) adjacent to the whole stem-bone interface.

RESULTS

Clinical results were good in all patients and no major complications were recorded. At radiography, all stems were stable. PET analyses after 4 weeks showed that bone mineralizing activity was significantly higher around the SP-CL stems, both compared to the Exeter group and to the contralateral healthy reference femur group. The SP-CL also had a prolonged raised activity compared to the Exeter group.

INTERPRETATION

F-PET/CT is a valuable tool for detailed analysis of bone formation patterns on the implant surface, and probably also for analyzing the subsequent secondary stabilization of a femoral stem.