

[18F]-fluoride PET/CT analyses of post-operative bone mineralization adjacent to acetabular cups at THA. A randomised clinical trial.

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

¹ Gävle sjukhus, ² Uppsala University, ³ Akademiska sjukhus

Background and Aim: The long-term success of total hip arthroplasty depends on the adequate bone formation of bone around the implant. This study utilizes 18F-fluoride Positron Emission Tomography/Computed Tomography (F-PET/CT) to evaluate skeletal metabolism in the periprosthetic bone surrounding uncemented acetabular cups with different surfaces.

Patients and Methods: A total of 28 patients scheduled for THA were randomly assigned to receive either an uncemented acetabular cup with a fibrous trabecular metal (TM) surface or one with a hydroxylapatite (HA) coating. The contralateral, healthy acetabulum was used as a reference for normal bone metabolism. All patients were assessed using plain radiographs, clinical scoring, and F-PET/CT at 1, 4, and 9 months after surgery. The acetabular bone region surrounding the cup was divided into 9 regions of interest (ROI).

Results: Radiographs revealed no signs of loosening, and all cups were stable. Clinical evaluations showed improvement in all patients' scores. F-PET/CT scans demonstrated higher levels of osseointegration for the TM cup compared to HA cup 1 month after surgery. Additionally, both study groups had higher SUV values compared to the healthy reference acetabulum at 1 and 4 months after surgery.

Conclusions: A detailed analysis of bone formation patterns on the implant surface shows that early healing is associated with higher mineral deposition, observed for both TM and HA cups. These findings provide valuable insights into the process of secondary stabilization of the implants, which is critical for the survival of the prosthesis.