

DEXA-scanning in description of bone remodelling and osteolysis around cementless acetabular cups

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The PhD dissertation was accepted by the Faculty of Health Sciences of the University of Aarhus for defence on November 11, 2005.

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Dan Med Bull 2006;53:81

ABSTRACT

Hip-revision surgery is frequently complicated by unexpected periacetabular osteolysis. Preoperative x-rays normally do not reveal sufficient information about the amount of osteolysis, but in the course of the operation, huge localized osteolytic lesions in the pelvic bone may appear. Wear-particles from polyethylene are suspected to play a role in the development of osteolysis. HA-coating of implants seems to reduce the risk by sealing off the bone-implant interface.

The aim of the present studies was to utilize DEXA-scanning to determine periacetabular osteolysis and to quantify the extent of osteolysis, including estimation of precision and accuracy of such a measure. Furthermore, a randomized controlled trial was conducted in order to study the effect of HA coating on bone mineral density changes around cementless acetabular components.

To test reproducibility and accuracy of a certain scanning model and to elucidate how a difference in patient posture affected the result; we conducted a study with 30 patients. To quantify the amount of bone loss in a controlled experimental cadaver model we performed a study comprising ten pelvic specimens.

Finally, we performed a clinical consecutive controlled randomized study. One hundred patients were operated with press-fit hemispherical cups +/- hydroxyapatite coating. Frequent DEXA-scans during the 3-year follow-up period were analyzed in order to analyze the pattern of bone remodelling around press-fit cups in the two groups.

The study of different scanning positions revealed that DEXA-scanning in the AP position gave the best reproducibility. Pelvic tilt of more than ten degrees affected reproducibility, and the intra observer variation was very low.

DEXA-scanning of the pelvic specimens corresponded very significantly with the amount of removed bone.

After three years, we neither found any differences between HA-coated cups and the standard cups, clinically nor measured by BMD. However, in one region, we found significantly better bone regeneration in the overweight and obese groups, compared to the normal weight patients; and the tendency was similar in the other regions.

DEXA-scanning has a high reproducibility, and has the ability to detect and quantify even small osteolytic lesion with high precision. In a controlled randomized trial, it proved reliable in the description of bone remodelling around prosthesis. We found no difference in bone remodelling between hydroxyapatite-coated and porous-coated cups. Further studies in these patients will reveal any long term-effect from HA-coating.