

AbstractID: 8781 Title: Effective dose to patients undergoing radiostereometric analysis of the lumbar spine

Purpose: To determine the effective dose of patients undergoing radiostereometric analysis (RSA) of the lumbar spine

Method and Materials: 12 patients with total disk replacement prosthetic devices in the lumbar spine participated in an IRB approved study to follow the sagittal and coronal range of motion using RSA. Image pairs were obtained at 6 weeks, and then 3, 6, 12, 18 and 24 months. Five image pairs were acquired at each visit (neutral, flexion, extension, and left and right lateral bend). Radiographic techniques were recorded for all acquired images. Patient mass was used to estimate abdominal AP thickness. Tube output and half value layers were measured at the appropriate tube accelerating potentials. This information was used with the image geometry to calculate the entrance kerma-area product (KAP) incident on the patients. The KAP and patient thickness were then used to estimate the energy imparted to the patients and the resulting effective dose.

Results: The average technique used was 141 kVp and 11.6 mAs. The mean effective dose per image pair was 0.304 mSv, and the mean per visit (5 image pairs) was 1.52 mSv with a standard deviation of 0.7 mSv. The average for the entire two year study was approximately 9.1 mSv. This compares very favorably with the value of 18 mSv reported in the 2000 UNSCEAR report for a single diagnostic lumbar spine study.

Conclusion: Image quality requirements for RSA are not the same as for general diagnostic imaging. The use of high kV techniques that would result in unacceptable low contrast images for general diagnostic purposes are adequate for visualizing fiducial beads used in RSA. Low doses allow for the acquisition of multiple image sets to detect motion of prosthetic devices with total effective doses that are much lower than a typical diagnostic lumbar spine examination.