

**Prospective evaluation of the interest of a free-hand electrical conductivity measuring device to reduce radiation exposure during fluoroscopically assisted pedicle screw fixation.**

Lubansu A, Pirotte B, Rynkowski M, Zemmouchi A, Dewitte O.

Pedicle screws are routinely used for posterior spine instrumentation. Despite their accepted advantages, potential complications from their misplacement remain a serious concern. Fluoroscopy is widely used to assist screw placement but is associated with radiation exposure to the patient and surgical staff with significant consequences. Strategies to reduce this exposure are recommended. In this study, we evaluate the efficiency of a free-hand electrical conductivity measuring device to prevent screw misplacement and to reduce radiation exposure during posterior pedicle screw fixation (PPSF).

**METHODS:** Since September 2005, 30 patients were treated by PPSF. They were randomized in two study groups. Group A (n=15, 10 men, 5 women, mean age: 50 yrs (21-71)), underwent PPSF under fluoroscopic control alone; in group B (n=15, 8 men, 7 women, mean age 49 yrs (25-73)) PPSF was performed under fluoroscopy with help of the free-hand electrical conductivity measuring device, that detects pedicle wall breaches with a sensitivity of 98 %. Measurements of radiation exposure were realized by placing dosimeters on both surgeon and patients. Radiation doses to the surgeon's thyroid, eyes and gonad were measured. Lateral and frontal dosimeters were placed on the patients. Fluoroscopy time was also recorded. CT scan and X-rays were taken postoperatively to assess screw position.

**RESULTS:** All screws were optimally positioned. Fluoroscopy time was 6.2 min in group A vs. 2.2 in group B, ( $P<0.001$ ), radiation exposure was 14.1 mSv in group A vs. 2.8 in group B, ( $P<0.02$ ) in frontal, and 61.8 mSv in group A vs. 16.7 in group B ( $P<0.01$ ) in lateral. No significant difference of radiation dose to the surgeon was noted, because dosimeters are not sensitive enough to scattered beams.

**DISCUSSION AND CONCLUSION:** Although fluoroscopy has been recommended to aid pedicle screw placement, strategies to minimize radiation exposure associated with PPSF are recommended. This study suggests that the free-hand electrical conductivity measuring device, while optimizing the positioning of screws, allows significant reduction of the amount of radiation exposure to the patient and therefore to the spinal surgeons.