

Publication

A novel approach to navigated implantation of S2 alar iliac screws using inertial measurement units

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The authors report on a novel method of intraoperative navigation with inertial measurement units (IMUs) for implantation of S-2 alar iliac (S2AI) screws in sacropelvic fixation of the human spine and its application in cadaveric specimens. **METHODS** Screw trajectories were planned on a multiplanar reconstruction of the preoperative CT scan. The pedicle finder and screwdriver were equipped with IMUs to guide the axial and sagittal tilt angles of the planned trajectory, and navigation software was developed. The entry points were chosen according to anatomical landmarks on the exposed spine. After referencing, the sagittal and axial orientation of the pedicle finder and screwdriver were wirelessly monitored on a computer screen and aligned with the preoperatively planned tilt angles to implant the S2AI screws. The technique was performed without any intraoperative imaging. Screw positions were analyzed on postoperative CT scans. **RESULTS** Seventeen of 18 screws showed a good S2AI screw trajectory. Compared with the postoperatively measured tilt angles of the S2AI screws, the IMU readings on the screwdriver were within an axial plane deviation of 0° to 5° in 15 (83%) and 6° to 10° in 2 (11%) of the screws and within a sagittal plane deviation of 0° to 5° in 15 (83%) and 6° to 10° in 3 (17%) of the screws. **CONCLUSIONS** IMU-based intraoperative navigation may facilitate accurate placement of S2AI screws.

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