Five-Year Experience for Navigated Iliosacral and Transiliac Transsacral Screw Implantation Using a Hybrid Operating Room

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Purpose: Percutaneous sacroiliac (SI) screw fixation is the standard treatment for fractures of the sacrum. Long transiliac transsacral (TITS) screws are being used more frequently for osteoporotic fractures to ensure optimal stability. Yet, visualization remains a major concern during implantation of these screws. New advances in intraoperative imaging and navigation seem to be an essential help during screw placement.

Methods: All percutaneous SI or TITS screws, which were implanted with intraoperative computer navigation in a hybrid operating room in the first 5 years of utilization (June 2012 to June 2017), were included. The hybrid operating room consists of a robotic 3-dimensional (3D) flat panel detector (Artis zeego, Siemens) linked to a navigation system (BrainLab Curve, BrainLab). Intraoperative 3D scans and postoperative CT were examined for screw perforation (grade 0 perforation: no perforation, grade 1: 0-2 mm, grade 2: 2-4 mm, grade 3: >4 mm). All patients were followed for a minimum of 1 year after surgery.

Results: 210 navigated percutaneous screws were placed in the dorsal pelvis of 187 patients (70 male, 117 female; mean age 64 ± 21 years) between June 2012 and June 2017. 127 SI screws and 83 TITS screws were implanted. 43 screws were combined with a supra-acetabular external fixator. 95.7 % of all screws showed either no perforation or a perforation <2 mm (n = 201). Six screws showed a grade 2 perforation (2.9%) and 3 screws a grade 3 perforation (1.4%). No significant difference between both screw types regarding the grade of cortical perforation could be seen. Two SI screws had to be revised in total. One SI screw was changed to a TITS screw due to loosening in osteoporotic bone. The other was replaced due to a deterioration of a preexisting injury of the lumbar plexus in a C-type pelvic ring fracture. Two postoperative parasthesias of the cutaneous lateralis nerve were detected postoperatively. One parasthesia of the ventral thigh was seen after implantation of an additional external fixator. No vascular complications or infections due to percutaneous dorsal screw implantation could be noticed. No significant differences between the operating time for TITS and SI screws could be seen.

Conclusion: Computer navigation in a hybrid operating room is a very safe and effective technique for SI and TITS screw implantation. Excellent image quality and large 3D volume leads to a high accuracy of both screw types. There was no prolongation of the operating time of TITS compared to SI screws.