

## Precision of Computer-Navigated Versus Fluoroscopic Guided Fixation of Percutaneous Iliosacral Screws

Jan F.M. Verbeek, BSc<sup>1</sup>; Erik Hermans, MD<sup>2</sup>; Arie B. van Vugt, MD, PhD<sup>2</sup>;  
Jan Paul M Frölke, MD, PhD<sup>1</sup>;

<sup>1</sup>Radboud University Medical Center, Nijmegen, The Netherlands;

<sup>2</sup>Medical Spectrum Twente, Enschede, The Netherlands

**Background/Purpose:** Percutaneous iliosacral (IS) screw fixation is commonly applied to stabilize the posterior pelvic ring in patients with unstable pelvic fractures. Adequate IS screw fixation is challenging and requires a high degree of spatial visualization skills and detailed knowledge of pelvic anatomy. Misplacement of the IS screw is not uncommon and may lead to iatrogenic nerve root injury. Therefore, it is of key importance to determine the most effective treatment strategy. Currently, IS screw fixation is assisted by two techniques; conventional fluoroscopy (CF) and computer-navigated surgery (CNS). However, evidence on the effectiveness of the technologies in practice is limited. The aim of this study is to compare CNS with CF on the accuracy of IS screw fixation by reviewing postoperative CT scans.

**Methods:** Patients with traumatic pelvic ring instability treated with percutaneous IS screw fixation (Biomet BV Dordrecht, The Netherlands) at two Level I trauma centers in the Netherlands in the period 2008-2013 were studied. A computer navigation system (Medtronic Heerlen, The Netherlands) had been implemented 3 years before. Excluded were patients with arthritis, osteoarthritis, pathologic fracture, tumor, and previous operation of the pelvic bone or acetabulum. Data on age, gender, body mass index (BMI), ISS, injury-surgery time interval, and Tile classification were collected. Insertion of the IS screws was assessed by postoperative CT scan and contrasted between CNS and CF.

**Results:** The computer-navigated group (n = 55) and the conventional fluoroscopic group (n = 24) were comparable in age (mean, 43 years), gender (58% male), BMI (25 kg/m<sup>2</sup>), ISS (27), injury-surgery time interval (7 days), and Tile classification (40% B, 60% C on average). In the CNS patient group a total of 109 screws were placed (2.0 per patient), 73% adequately. In the CF group the findings were 40 screws (1.7 per patient), 75% adequately. Inadequate fixation comprised neural foramina hit: CNS 19 screws (17%) versus CF 5 screws (13%),  $P = 0.90$ ; and extraosseous dislocation: CNS 11 screws (10%) versus CF 5 screws (12%),  $P = 0.63$ . The reoperation rates did not differ between CF and CNS.

**Conclusion:** In contrast to what has been suggested by previous studies, we found no benefit from computer-navigated IS screw fixation compared to fluoroscopic technique regarding precision of screw placement on postoperative CT scans.

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an "off label" use). For full information, refer to page 600.