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Good functional outcome in patients suffering fragility fractures of the pelvis treated with percutaneous screw stabilisation: Assessment of complications and factors influencing failure

Henrik Eckardt[a,*], Alexander Egger[a], Rebecca Maria Hasler[a], Christoph J. Zech[b], Werner Vach[a], Norbert Suhm[a], Mario Morgenstern[a], Franziska Saxer[a]

[a] Department of Orthopaedic and Trauma Surgery, University Hospital Basel, Spitalstrasse 21, 4031 Basel, Switzerland
[b] Department of Interventional Radiology, University Hospital Basel, Petersgraben 4, 4031 Basel, Switzerland

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ABSTRACT

Background: Low energy pelvic ring fractures in the elderly have traditionally been treated conservatively, a treatment with potential long-term complications and loss of self-independence. Percutaneous screw stabilisation of the posterior pelvic ring is a new treatment modality that enables immediate mobilisation. The aim of this study was to assess the functional outcome after sacroiliac stabilisation in the elderly.
Methods: All elderly patients with a surgically stabilised low energy pelvic fracture between 2010 and 2015 were included. In 2016 a radiographic follow up and functional test was performed at least one year postoperative.
Results: The 50 operated patients had a mean age of 79 years and a one-year mortality of 10% (5/50). Only six patients lost independency after the pelvic fracture and moved to nursing home. The mean Timed Up and Go test was 16 s at follow-up. The operation of the posterior pelvic ring averaged 63 min with a radiation equal to a diagnostic pelvic CT. One intra-foraminally placed screw was immediately removed and 9 patients were later re-operated on due to symptomatic loosening of one or more screws. No loosening of screws was seen in 11 patients where both S1 and S2 were stabilised and out of 23 trans-sacral screws (crossing both sacroiliac joints) only two loosened.
Discussion: CT guided stabilisation of the posterior pelvis is safe and most patients resumed good function and independent living. The risk of a revision operation was 20%, but trans-sacral screw stabilisation in both S1 and S2 could reduce the risk of implant loosening.

Introduction

The incidence of pelvic ring fractures in the elderly is around 90/100.000 and increasing due to demographic changes [1,2]. This type of fracture often occurs after low-energy trauma and has traditionally been treated conservatively. Conservative treatment though is associated with potential severe long-term complications: In our hospital 132 patients older than 65 years presenting with a pelvic ring fracture after minor trauma were treated conservatively and evaluated after one year [3]. The one-year mortality was 19% and 27% of patients who had lived independently before the fracture lived in nursing homes. These data document the severe individual morbidity associated with pelvic ring fractures in the elderly.

Rommens examined 245 low-energy pelvic ring fractures in the elderly, suggested a new classification system for this entity and entitled it Fragility Fractures of the Pelvis (FFP) [2]. He suggested operative treatment of FFP by trans-sacral stabilization with a bar crossing both sacroiliac joints thus providing fracture stabilization, reducing pain and allowing full weight bearing. In 2011 Rommens published the results of trans-sacral bar stabilisation in 11 patients with FFP reporting a favourable one-year outcome and few complications [4]; in 2016 Sanders documented reduced pain and increased mobility one year after percutaneous trans-sacral stabilisation in patients with FFP [5].

The primary aim of this study was to assess the functional outcome after CT-controlled surgical sacroiliac or trans-sacral stabilization in patients with FFP. The secondary objective was to describe the treatment modes and their potential association with complications.

* Corresponding author at: Department of Orthopaedic and Trauma Surgery, University Hospital Basel, Spitalstrasse 21, 4031 Basel, Switzerland.
E-mail address: henrikeckardt@gmail.com (H. Eckardt).

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Methods

Patient population

All patients with FFP who were treated with surgical posterior pelvic ring stabilization at our centre between 2010 and 2015 were included. FFP were defined as CT-verified fractures of the posterior and anterior pelvic ring in an elderly without or after minor trauma. Patients with multiple fractures and polytraumatized patients were excluded. The indication for surgical stabilisation was persistent mobility-limiting pain after FFP and insufficient effect of conservative therapy.

Baseline data collection

Data on all operated patients were retrieved from the clinical information system. Demographic data included: gender, age, and the pre-injury housing situation. The chronic disease burden was assessed with Charlson Comorbidity Index (CCI) based on the severity of 17 defined diseases [6], the physical status was assessed using the American Society of Anaesthesiologist (ASA) Score. Further potential risk factors for loosening of implants and implant failure recorded were Body Mass Index (BMI), the latency from the first symptoms to the operation, the FFP classification, previous pelvic fractures, steroids-medication, cigarette smoking, alcohol abuse, rheumatoid arthritis, diabetes mellitus and bisphosphonate therapy.

Pre-operative radiographic analyses

The pre-operative CT scans were analysed and the fractures were classified according to the comprehensive FFP-classification by Rommens and Hofmann [2]. The fractures were classified independently by three investigators and in case of discrepancy discussed until a consensus was found. The classification is based on the degree of instability and distinguishes between minimal (FFP Type I), moderate (FFP Type II), high (FFP Type III) and highest instability (FFP type IV).

Operation and surgery related factors

For the intervention, patients were positioned on the CT table in a prone or lateral decubitus position and a planning scan was performed (Fig. 1). The CT-scanner was a spiral multi-slice CT Sensation10 from 2010 to December 2014 and a spiral MSCT Somatom Definition Edge (both from Siemens HealthCare, Zürich, Switzerland) thereafter. On the transversal slices of the planning scan the optimal trajectory for either sacroiliac or trans-sacral screw stabilization was planned. A sacroiliac screw was implanted from lateral through ilium, the sacroiliac joint and anchored in the body of S1 or S2. A trans-sacral screw followed the same path but passed through the sacral body, crossed the contralateral sacroiliac joint and anchored in the contralateral ilium. After standard scrubbing and sterile dressing, a K-wire was advanced to the bone

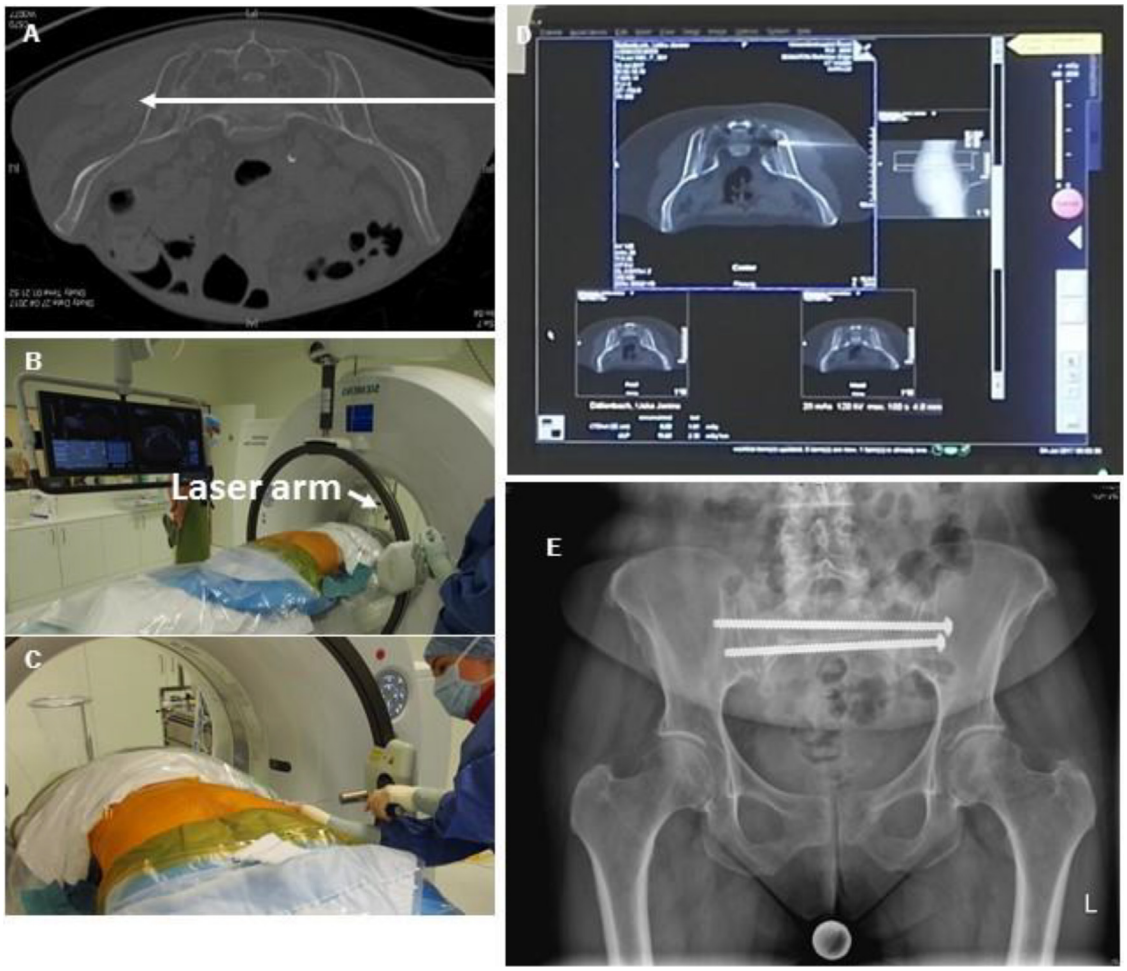

Fig. 1. (A) Planning of the screw trajectory on axial images. (B) Patient in prone position. The planned entry point is projected on the skin using a laser pointer on the arc. (C) Introduction of a Kirschner-wire with hammer or drill. (D) Intropeative control of the wire position during insertion with a low-dose scan resulting in 3 images with 4.8 mm distance. (E) Radiograph of the pelvis after insertion of 2 trans-sacral 7.3 cannulated screws.

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