Minimally Invasive Stabilization of Acetabular Fractures With Navigation in Combination With Robot-Assisted 3D Imaging

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Purpose: Acetabular fractures are complex injuries that often poses challenges for surgeons. With demographic change, the frequency of complex fractures is also increasing into old age. In addition, these patients are often treated for chronic diseases, which increases the perioperative risk. Surgical procedures of open reduction and plate osteosynthesis can be associated with considerable morbidity and complications due to the complexity of the operation. Minimally invasive screw osteosynthesis offers a promising alternative that enables stable fixation while minimizing soft-tissue trauma and reducing the risk of intraoperative and postoperative complications.

Methods: All patients between January 2015 and December 2023 who underwent surgical treatment for minimally or nondisplaced acetabular fractures were included. The inclusion criterion was the performance of robot-assisted and navigated, minimally invasive screw osteosynthesis in minimally or nondisplaced acetabular fractures. Highly displaced fractures and patients with acetabular protrusion with the necessity of open reduction were excluded. Demographic data, pre- and postoperative mobility, postoperative pain, surgical and nonsurgical complications, discharge modality, and mortality were analyzed.

Results: 101 patients (59 female, 42 male) were surgically treated using minimally invasive screw osteosynthesis with a navigation system and the robot-assisted imaging unit. The average age was 71.1 years (range, 17-98). The patients were surgically treated within an average of 3.1 days (1-5 days) after admission and remained in inpatient care for an average of 9.1 days (9-26 days). CHARMI (Charité Mobility Index) was 9.2 on average before trauma. The patients were all mobilized daily under physiotherapeutic guidance. An average CHARMI of 6.7 was measured before discharge. 79% of all patients were discharged to their usual environment. 21% of patients could not be discharged to home and they required short-term or permanent care in a retirement home. In 2 patients, a secondary screw dislocation occurred after mobilization, which is why revision surgery was performed with repositioning of the screw osteosynthesis and a hip arthroplasty, respectively.

Conclusion: Minimally invasive navigated screw osteosynthesis thus offers an adequate option for the treatment of nondisplaced and minimally displaced acetabular fractures. Attention must be paid to the correct indication and surgical technique.