

Cortical Breach with Percutaneous Antegrade Anterior Column Screw Placement*Thomas Revak, DO; Christopher Muncie, DO*

Purpose: Errant placement of percutaneous anterior column screws (PACS) risk injury to the bladder or neurovascular structures. Little data have been published examining the incidence and associated complications with PACS placement. The purpose of this study is to determine the incidence and location of cortical breach using Nakatani classification and associated complications. Our hypothesis was cortical breach is higher than expected but associated with minimal complications.

Methods: A retrospective chart review at a single Level I trauma center identified patients who underwent open reduction and internal fixation or percutaneous fixation of acetabular fractures that included the use of PACS. Preoperative radiographs and CT images were assessed to determine fracture classification. Postoperative CT imaging was reviewed to assess location of cortical breach according to Nakatani classification and length of screw prominence. Screw sizes were recorded in addition to associated complications and revision procedures for prominent screws.

Results: 29 out of 67 screws (43.3%) were found to breach cortex with a majority of screw breach within zones 2 and 3 ($P = 0.50$). Anterior cortical breach was observed in 76% of aberrant screws. Screws with anterior cortical breach were most prominent in zone 2 compared to other zones ($P = 0.016$). Average length of screw breach was 10.3 mm (range, 2.34-20.11 mm) with significantly longer screw prominence in zone 2 compared to zones 1 and 3 (16.5 mm vs 6.95 mm and 7.46 mm, $P = 0.003$). When comparing screw size, 5.5-mm screws were less likely to breach cortex vs 6.5-mm screws ($P = 0.006$). 6.5-mm and 5.5-mm screws showed significantly more prominence compared to smaller diameter screws ($P = 0.007$); however, there was no statistical difference in screw prominence between 5.5-mm and 6.5-mm screws ($P = 0.60$). No complications were observed with one revision surgery for zone 2 anterior cortical breach.

Conclusion: Our results showed cortical breach was more common than expected. Screw breach was most common anteriorly and within zones 2 and 3 in close proximity to the neurovascular bundle. 5.5-mm screws were less likely to breach and may allow for safe placement without sacrificing stability with smaller screws. Incidence of screw prominence was higher than expected highlighting the need for careful scrutiny of intraoperative fluoroscopy or use intraoperative CT. Despite these findings, no associated complications were observed.