Predicting Early Failure of Percutaneous Superior Ramus Screws

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**Purpose:** The most utilized system for describing anterior pelvic ring injury is the Nakatani classification. Prior studies have demonstrated a failure rate of up 15% when treated with percutaneous ramus screw placement. Interestingly, most failures were observed with zone 2 fractures treated with retrograde ramus screws. This dichotomy was thought to hinge around the ability of antegrade ramus screws to hold purchase in the good bone above the acetabulum. Many of these screw failures occurred with unicortical fixation within the metaphyseal bone at the acetabular junction. We sought to determine if fracture morphology and the use of longer osseous fixation pathways could alleviate this propensity for screw failure.

**Methods:** A retrospective review of all percutaneous superior ramus screws placed over the past 5 years for pelvic ring injuries was performed at our institution. All patients underwent surgery for an unstable pelvic ring injury demonstrated on dynamic stress views performed under anesthesia. All had fixation of both the anterior and posterior ring. Only patients with a minimum of 6 weeks radiographic or CT imaging were included. Failures were defined as screw cutout or interval fracture displacement greater than 5 mm. Statistical analyses were performed using Wilcoxon rank sums test and Fisher’s exact test.

**Results:** There were a total of 7 failures out of 138 superior ramus screws (5.1%). Mean age of failures was 59 ± 20. Only 1 patient required revision screw fixation due to significant loss of reduction. Of the screws that failed, 5 were placed in a retrograde fashion, 5 had bicortical fixation, 5 were 4.5-mm screws, and 2 were 7.0-mm screws. Ramus fracture patterns included 4 oblique and 3 comminuted whereas none of the failures included transverse or segmental ramus fractures. Based on the Nakatani classification, 4 fractures were in zone 2, 2 were in zone 1, and 1 was in zone 3. 3 injuries were Young-Burgess lateral compression type 1, 3 had bilateral posterior ring injuries, and 1 had bilateral anterior ring fractures. Failure modes included 4 screws that cut out proximally, 2 screws that cut out distally, and 1 screw that bent at the fracture site.

**Conclusion:** The incidence of percutaneous superior ramus screw failure in our cohort was around 5% which is significantly lower than previously reported. No single fracture or fixation variable was found to be an independent predictor for superior ramus screw failure. Larger studies are indicated to more accurately determine risk factors for failure.