

**Anterior Pelvic Ring Fracture Pattern Predicts Displacement in Complete and Incomplete Sacral Fractures Associated with Lateral Compression Injuries**

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**Purpose:** Predicting stability of lateral compression (LC) pelvic ring injuries on static imaging can be difficult and may require an examination under anesthesia (EUA) to determine management. Previous studies show higher rates of instability with complete sacral fractures associated with bilateral pubic rami fractures. This study aims to establish anterior pelvic ring injury patterns that are particularly susceptible to displacement to help guide management.

**Methods:** This was a retrospective study of patients treated for LC pelvic ring injuries between 2014 and 2019. Radiographic imaging was used to characterize the anterior fracture location (parasymphyseal, pubic body, Nakatani region of pubic rami, or root) and pattern (comminuted, oblique, segmental, or transverse). Primary outcome measures were displacement at follow-up and instability on EUA requiring operative stabilization. On the side of the pelvis with more significant fracture pattern, analysis was performed by calculating each pattern's absolute risk (AR) of displacement and using Fisher's exact test with significance of  $P < 0.05$ . Sacral fracture type was accounted for by using bivariate analysis with significance of  $P < 0.05$ .

**Results:** 116 patients were eligible for inclusion. 73 patients (63%) had incomplete sacral fractures; 61 patients (53%) displaced, and 55 (47%) had no displacement. Univariate analysis showed that displaced patients were more likely to be older (53 vs 45 years,  $P = 0.062$ ) and female (55%,  $P < 0.01$ ). If at least one of the inferior or superior ramus fracture patterns was transverse or unfractured, the risk of subsequent displacement was 0% ( $P < 0.01$ ). Bivariate analysis revealed that comminuted (AR 79%,  $P < 0.05$ ) and oblique (AR 83%,  $P < 0.05$ ) Nakatani 1 (medial) superior pubic rami fractures were associated with increased risk of displacement for both complete and incomplete sacral fractures.

**Conclusion:** Based on this analysis, displacement of both complete and incomplete LC sacral fractures was more likely in older patients, females, and presence of comminuted or oblique Nakatani 1 (medial) superior pubic rami fracture. If a superior or inferior ramus was transverse, nondisplaced, or not fractured, the risk of displacement was 0%. This information will help disclose patients that may benefit from nonoperative management and identify those who should proceed with EUA or surgical fixation.