

A Predictive Scoring System for Late Displacement and Deformity Following Non-operative Treatment of Young-Burgess Lateral Compression Type 1 (OTA 61-B1/B2) Pelvic Ring Injuries

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Purpose: The purpose of this study was to identify risk factors and develop a scoring system based on static radiographs that can predict late displacement and deformity of Young-Burgess lateral compression type 1 (LC1) pelvic ring injuries treated nonoperatively.

Methods: A retrospective analysis of two Level I trauma centers was performed. All LC1 (AO/OTA 61-B2/B3) pelvic ring injuries treated nonoperatively with minimum 3-month follow-up from January 2019 through January 2024 were reviewed. Exclusion criteria were nonacute presentations, nonunions, pathologic fractures, and non-ambulatory patients. The primary outcome measure for this study was greater than 1 cm of pelvic ring displacement from initial to final radiographs showing fracture healing. Patient demographic and radiologic risk factors were identified on univariate analysis. Statistically significant variables ($p < 0.05$) entered a multivariable logarithmic regression to develop a scoring system via stepwise elimination of noncorrelative factors, which was assessed via receiver operator characteristic (ROC) curve analysis.

Results: Included for analysis were 213 LC1 injuries managed nonoperatively. Female sex, age, initial anterior ring displacement, bilateral anterior ring involvement, superior ramus fracture angle, superior ramus comminution, Nakatani zone of fracture, and complete sacral fracture were univariately correlated with development of pelvic deformity. After multivariate analysis with stepwise elimination, only superior ramus fracture angle, initial anterior ring displacement, and superior ramus comminution remained significant. The scoring system developed scored 4 points for a longitudinal fracture angle, 2 points for anterior ring displacement, and 1 point each for superior ramus comminution or oblique fracture angle. Deformities developed in 88% of patients with a total score greater than or equal to five. The area under the ROC curve for the scoring system was 0.86 with a 95% CI of 0.81 to 0.91.

Conclusion: Superior ramus fracture angle, comminution, and anterior ring displacement correlate most with late displacement and deformity of LC1 fracture patterns. A combination of these factors in a developed scoring system increases the risk of displacement.