Type of Stress Examination Technique for Minimally Displaced LC1 Pelvis Fracture Is Associated With Instability Diagnosis and Operative Treatment: A Retrospective Multicenter Analysis

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Purpose: Modern treatment algorithms for minimally displaced lateral compression type 1 (LC1) injuries have advocated for the use of a stress examination to guide surgical decision making. Authors have reported on the use of a supine emergency department stress (SED), lateral emergency department stress (LED), and stress examination under anesthesia (EUA). The purpose of this study was to compare the rates of stress positivity and conversion to surgical treatment between techniques.

Methods: A retrospective review of 8 Level I trauma centers was performed to identify patients with minimally displaced LC1 injuries that underwent stress examination. The primary outcome was a positive stress examination defined as 100% displacement of the ramus or 1 cm of shortening. Statistical analysis comparing stress results between SED, LED, and EUA cohorts was performed using $\chi 2$ test. Analysis was stratified by fracture instability, determined using the validated LC1 injury Beckmann scoring system: <7 (stable), 7-9 (indeterminant), and >9 (unstable).

Results: 547 patients with minimally displaced LC1 injuries received a stress examination. The median cohort age was 54 years (range, 18-90), 57% were female, with a median body mass index of 24 (interquartile range [IQR] 21-27), and a median Charleson Comorbidity Index of 1 (IQR 0-3). There were 218 SED, 134 LED, and 195 EUA stress examinations. The rate of stress positivity and conversion to surgical intervention varied significantly by stress examination technique. For Beckmann score <7 stress positivity occurred: 16% SED, 35% LED, and 64% EUA (P<0.001). For Beckmann score 7-9 positivity occurred: 23% SED, 66% LED, and 78% EUA (P<0.0001). For Beckmann score >9: 44% SED, 81% LED, and 88% EUA (P = 0.03). Surgical fixation occurred in 24% SED stress patients, 41% LED stress patients, and in 56% EUA patients (P<0.001).

Conclusion: When stratified by fracture severity, stress examination positivity varied significantly by the technique of stress examinations performed. This translated to significant variations in conversion to surgical intervention. Future research should be dedicated toward determining the type and utility of stress exams in minimally displaced LC1 injuries.