External Fixator Use Influences Patients' Experience of Pain 1 Year After Definitive Fixation

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Purpose: External fixation is a helpful tool to stabilize complex fractures before definitive fixation for many reasons. However, little is known regarding the psychological effects of external fixator placement, specifically the effect on a patient's experience of pain. The purpose of this study was to determine whether external fixator use is associated with alterations in patients' psychosocial profiles, which are associated with poor long-term outcomes. We hypothesized that patients initially treated with external fixation would have worse pain self-efficacy, pain interference, chronic pain, and pain severity compared to those treated without external fixation at 1 year after definitive fixation.

Methods: 96 subjects with lower extremity fractures requiring surgical fixation and without history of chronic pain (age 41.7 ± 14.7 years; 54% male; 18 external fixators) were recruited from a Level-I trauma center. Pain self-efficacy, pain interference, chronic pain, and pain severity were assessed at 12 months (mo) after definitive fixation. Pain self-efficacy and pain interference (PI) were measured using pain-self efficacy (PSEQ) and PROMIS (Patient-Reported Outcomes Measurement Information System) PI scores, respectively. Chronic pain was defined as pain present greater than 3 mo and bothersome at least half of days over the last 6 mo. Pain severity was measured using the Brief Pain Inventory (BPI). Multivariate linear and logistic regression models were used to determine if external fixator use prior to definitive fixation predicted each outcome when controlling for ISS and fracture severity (using AO classification system).

Results: PSEQ and PROMIS PI scores demonstrated significant differences between individuals with and without external fixator placement (PSEQ mean difference: 11.2; 95% confidence interval [CI]: 3.7-18.7, $P < 0.01$; PROMIS PI mean difference: 5.8; 95% CI: 0.4-11.3, $P = 0.04$). Patients with chronic pain were significantly more likely to have been treated with external fixator prior to definitive fixation (odds ratio [OR]: 7.5; 95% CI: 1.8-30.8, $P = 0.005$). BPI Pain Severity scores were not different between patients treated with and without external fixator (BPI mean difference: 1.1; 95% CI: –0.18-2.5, $P = 0.09$).

Conclusion: Use of an external fixator may be associated with decreased PSEQ and increased PI and chronic pain that persists 1 year after definitive fixation. The increases in pain interference and chronic pain are present without a corresponding increase in pain severity, suggesting psychosocial causes rather than physical factors leading to these worse outcomes. Benefits of external fixator use should be weighed against these apparent effects on patients' experience of pain, which are associated with poorer outcome. Patients who require external fixator use may benefit from early cognitive behavioral therapy or pain education to improve their overall mental profile and long-term outcomes.