Somatosensory Reprogramming Extends Beyond the Injured Limb and Influences Nociception After Surgically Treated Lower Extremity Fractures

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INTRODUCTION:
Peripheral and central somatosensory reprogramming occurs in patients with chronic pain. It is unknown if and when this reorganization occurs in patients with chronic pain who underwent surgical treatment of Lower Extremity Fractures (LEF). Quantitative Sensory Testing (QST) can be utilized to identify patients with somatosensory alterations which often occur in patients with chronic pain. The purpose of this study was to determine QST changes in the injured and uninjured limb are associated with chronic pain following surgical treatment of LEFs.
METHODS:
An observational cohort study of 120 patients (43.9±15.6 years) with a LEF requiring surgical fixation were recruited from a Level I Trauma Center. Pain Pressure Threshold testing (PPT) was performed in the distal quadriceps region of the injured/non-injured limbs at 6-weeks, 3-months, 6-months and 12-months post operatively. At 12-months patients completed questionnaires assessing for NIH defined chronic pain, pain severity, and pain interference. Linear or logistic regressions were utilized as appropriate to assess the association between relative differences in PPT values and 12month patient reported outcomes.
RESULTS:
101 (84%) subjects completed this study; 52.5% of participants were female, 86.7% Caucasian. In the injured limb, each 10% increase in PPT between 6 and 12-months was associated with a 48% increase in the odds of having chronic pain at 12-months ($p=0.002$) but not pain severity or pain interference. In the uninjured limb, each 10% increase in PPT between 6 and 12-months was associated with a 45% increase in the odds of having chronic pain, a 7.6% increase in mean pain severity, and a 1.21pt increase in pain interference ($p=0.003$ $p=0.009$, $p=0.003$). Increases greater than 10% in PPT in either limb between 6-weeks and 3-months nor 3-months to 6-months were not associated with development of chronic pain, pain severity and increased pain interference ($p > 0.05$).
DISCUSSION AND CONCLUSION:
Somatosensory reprogramming appears to occur in both the injured and uninjured limb between 6 and 12-months in patients who develop chronic pain after lower extremity fracture. These results suggest that interventions designed to prevent reprogramming should be implemented prior to 6-months and that there may be more than peripheral sensory reprogramming at play. Further evaluation of QST's and their association with pain types is needed to guide targeted interventions.