Predictors of Heterotopic Ossification following Surgically Treated Elbow Trauma

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INTRODUCTION:
Heterotopic ossification (HO) is a common complication following surgically treated elbow trauma. While prophylactic measures have been studied, no interventions have been identified to be effective in the setting of elbow trauma. The primary objective of this study was to determine which patient, injury, and surgical characteristics are associated with HO formation after surgically treated elbow trauma.
METHODS:
Data for this study were obtained from 158 patients enrolled in a randomized controlled trial assessing the effect of indomethacin as a prophylactic intervention against HO following surgically treated elbow trauma. Injuries included: elbow fracture-dislocations, distal humerus fractures, capitellum/trochlear fractures, radial head fractures, olecranon fractures, trans-olecranon fractures, and monteggia fractures. Binary regression logistical analysis was completed with the presence of heterotopic ossification as the dependent variable to determine patient, injury, and surgical characteristics associated with a higher risk of developing HO.
RESULTS: Overall, 83 patients (52%) developed HO after surgical treatment of elbow trauma. In terms of patient demographics, dominant arm injury (odds ratio [OR] = 2.05, 95% confidence interval [CI]: 1.05 to 4.02, $p = 0.036$), BMI ≥ 25 (OR = 2.45, 95% CI: 1.16 to 5.17, $p = 0.019$), and age (OR = 1.02, 95% CI: 1.00 to 1.04, $p = 0.047$) all significantly increased the odds of developing HO. In terms of injury diagnoses, elbow fracture-dislocations (OR = 3.46, 95% CI: 1.77 to 6.79, $p < 0.001$) were more likely to result in HO. Conversely, patients with olecranon fractures (OR = 0.204, 95% CI: 0.07 to 0.58, $p = 0.003$) had lower odds of developing HO. With respect to surgical intervention, medial collateral ligament (MCL) repair (OR = 5.42, 95% CI: 1.16 to 25.34, $p = 0.032$), coronoid open reduction and internal fixation (OR = 4.14, 95% CI: 1.87 to 9.19, $p < 0.001$), and lateral collateral ligament (LCL) repair (OR = 2.79, 95% CI: 1.45 to 5.33, $p = 0.002$) all significantly increased the odds of developing HO. Patients who underwent medial sided elbow approaches (OR = 4.16, 95% CI: 1.87 to 9.24, $p < 0.001$) and combined medial and lateral approaches (OR = 6.15, 95% CI: 2.39 to 15.86, $p < 0.001$) were more likely to develop HO.
DISCUSSION AND CONCLUSION:
This study highlights the significant patient, injury, and surgical factors that are associated with developing HO following surgical management of elbow trauma. Age, dominant arm injury, BMI ≥ 25, elbow fracture-dislocations, MCL repair, coronoid fixation, LCL repair, medial sided elbow exposures, and combined (medial & lateral) exposures were associated with increased odds of developing HO. Patients with these risk factors should be appropriately counselled regarding their odds of developing this complication. Further HO prophylactic strategies should be developed and studied targeting these high-risk factors in the setting of elbow trauma requiring surgical management.