

Posttraumatic Elbow Arthrofibrosis Incidence and Risk Factors:**A Retrospective Review**

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Purpose: Loss of elbow range of motion can significantly decrease patient quality of life and have marked affect on outcomes. Posttraumatic arthrofibrosis is a common cause of decreased elbow range of motion (ROM) in adults. A loss of 50% of elbow motion has been found to compromise 80% of upper extremity function. Although arthrofibrosis has been extensively studied in the lower extremity, sparse data exist concerning this problem in the upper extremity. The aim of this study is to examine the incidence and risk factors of post-traumatic elbow arthrofibrosis.

Methods: We conducted a retrospective chart review of intra-articular elbow fracture patients seen at our trauma Level I hospital from March 2004 to January 2014. Demographic information, final range of motion, duration of immobilization, fracture pattern, injury mechanism, additional surgery, postoperative deep infection, and medical comorbidity data were recorded. Patients were included in the study if they had a minimum of 3 months follow-up or return to functional arc ROM (defined as a flexion/extension arc of at least 100° in the absence of an elbow flexion contracture greater than 45°) prior to 3 months. Pearson chi-squared and Student t test were used to evaluate categorical and continuous variables, respectively. A logistic multivariate regression model was used to predict arthrofibrosis risk factors. Statistical significance was set at a P value of <0.05.

Results: 470 consecutive patients with intra-articular elbow fractures were identified. 390 patients (83%) were included in the study. 80 patients were excluded from the study because of inadequate follow-up or ROM documentation. 302 patients had documented return to a functional arc range of motion; 88 (23%) patients developed elbow arthrofibrosis. There were no statistically significant differences between the two groups in terms of age, gender, or medical comorbidities. Duration of immobilization, fracture pattern, and energy were all statistically significant predictors of arthrofibrosis. Average time of immobilization was 19 days in patients who developed arthrofibrosis as compared to 13 days of immobilization in patients who recovered a functional arc ROM ($P < 0.001$). High-energy mechanism increased the risk of arthrofibrosis with 44 of 126 (35%) high-energy injuries developing arthrofibrosis as compared to 44 of 264 (17%) low-energy injuries ($P < 0.001$). 7 of 16 (44%) patients with deep postoperative infection developed arthrofibrosis as compared to 81 of 374 (22%) noninfected patients ($P = 0.038$). Elbow fracture dislocations and distal humerus fractures demonstrated statistically significant increased rates of arthrofibrosis with 24 of 67 (36%) patients with elbow fracture dislocations and 27 of 99 (27%) of distal humerus fractures developing arthrofibrosis ($P = 0.005$, $P = 0.027$, respectively). Only 22 of 136 (16%) olecranon and 15 of 88 (17%) radial head fractures went on to develop arthrofibrosis ($P = 0.194$, $P = 0.159$, respectively). Average follow-up was noted to be 242 days.

Conclusion: The functional sequelae of posttraumatic elbow arthrofibrosis can be extraordinarily disabling. Understanding the rate at which this process affects patients and the

predictive risk factors associated with its development is critical. To our knowledge, this study is the first to demonstrate that 23% of patients with intra-articular elbow fractures go on to develop posttraumatic elbow arthrofibrosis. Additionally, duration of immobilization, fracture pattern, and energy were predictive risk factors for the development of elbow arthrofibrosis. Although fracture pattern and injury are nonmodifiable predictors of arthrofibrosis, duration of immobilization proves to be an important modifiable predictor of arthrofibrosis.

Table 1. Results of Multivariate Logistic Regression Evaluating Predictors of Elbow Arthrofibrosis

<i>Variable</i>	<i>p-value</i>
Age	0.94
Alcohol	0.480
Days of Immobilization	<.001
Deep Infection	0.038
Diabetes	0.095
Distal Humerus Fracture	0.027
Elbow Fracture-Dislocation	0.005
Olecranon Fracture	0.159
Radial Head Fracture	0.194
Sex	0.963
Tobacco	0.856

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.