Preoperative Risk Factors Associated with Inferior Outcomes Following Arthroscopic Elbow Contracture Release

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Abstract

Introduction

Elbow contractures can occur for many reasons including age-related degenerative disease, inflammatory conditions, and post-traumatic injury. The resulting pain and reduced range of motion (ROM) can significantly interfere with activities of daily living and impede patient functionality. One treatment option for elbow contractures is arthroscopic osteocapsulectomy. The purpose of this study is to evaluate the preoperative risk factors associated with inferior clinical outcomes following arthroscopic elbow osteocapsulectom.

Materials & Methods

This retrospective cohort study included patients ≥18 years old who underwent arthroscopic elbow osteocapsulectomy at a single institution between January 2015 and November 2024. Patients were included if they had pre- and postoperative Patient Reported Outcome Measurement Information System (PROMIS) Upper Extremity Function (P-UE), Pain Interference (P-Interference), and Pain Intensity (P-Intensity) scores collected ≥6 months follow-up. Post operative PROMIS scores were stratified into tertiles to identify patients with inferior clinical outcomes, defined as the lowest tertile for function and highest tertile for pain-related measures. Multivariate logistic regression analyses were performed to evaluate the association between preoperative patient factors and inferior postoperative outcomes. Postoperative complications, including recurrent contracture, neurological symptoms, and reoperations, were also recorded.

Results

A total of 65 patients (47 male, 18 female) with a mean age of 52.2 (Range: 19 - 77) were followed for a mean of 17.5 (range: 1- 95) months postoperatively for in-person assessments (**Table 1)**. Mean flexion improved from 122° (range, 80–145°) to 127° (90–150°) ($p = 0.02$), extension from 20° (0–50°) to 14° (–5–45°) ($p < .001$), and the flexion-extension arc from 103° (30–140°) to 113° (45–145°) ($p < .001$). Supination and pronation remained stable (79° to 81° and 85° to 85°, respectively) (**Table**

PROMIS scores were collected at a mean follow-up of 51.6 (range: 7 – 131) months. Function ($p = 0.01$) and pain scores ($p = 0.01$) both improved significantly following surgery. Female sex (odds ratio [OR]: 10.7; $p = 0.001$) and history of inflammatory arthritis (OR: 4.5; $p = 0.04$) were associated with low postoperative P-UE scores. History of inflammatory arthritis (OR: 6.8; $p = 0.01$) was associated with high postoperative P-Intensity scores

Discussion

Arthroscopic elbow osteocapsulectomy can improve function and range of motion; however, outcomes may vary based on preoperative patient characteristics. Female sex and history of inflammatory arthritis were associated with lower postoperative functional scores and higher pain levels.

Key words: Elbow contracture, elbow stiffness, arthroscopic osteocapsulectomy, ulnar nerve decompression, patient-reported outcomes, elbow arthroscopy

Level of Evidence: III, retrospective cohort

Table 1: Patient demographics (N = 65)

Variable	Number Count (%) or Mean (Range)
Age at surgery (years)	52.2 (19 - 77)
Sex assigned at birth	
Female	18 (27.7)
Male	47 (72.3)
BMI (kg/m2)	28.9 (20.6 - 37.6)
Race	
White	49 (75.4)
Black or African American	10 (15.4)
Smoker	24 (36.9)
ASA	
1	16 (24.6)
2	43 (66.2)
3	6 (9.2)
Comorbidities/History	
Diabetes	3 (4.6)
Hypertension	10 (15.4)
Inflammatory arthritis	16 (24.6)
Malignancy affecting the elbow	4 (6.2)
Osteochondritis dissecans	2 (3.1)
Elbow fracture	19 (29.2)
Elbow dislocation	3 (4.6)
Prior elbow surgery	20 (30.8)
Preoperative symptoms	
Preoperative night pain	38 (58.5)
Ulnar nerve symptoms at time of surgery	13 (20.0)
Surgical details/primary diagnosis	
Dominant arm procedure	44 (67.7)
Osteoarthritis	54 (83.1)
Inflammatory arthritis	6 (9.2)
Posttraumatic soft tissue contracture	16 (24.6)
Prophylactic ulnar nerve release performed	7 (10.8)
Time between surgery and collection of PROMIS scores (months)	51.6 (7 - 131)

BMI = Body mass index; ASA = American Society of Anesthesiologists score; PROMIS = Patient-Reported Outcomes Measurement Information System.

Table 2: Pre vs Postoperative Range of Motion and Outcome Scores (N = 65)

Variable	Preop Mean ± SD	Postop Mean ± SD	Δ Change Mean ± SD	p value*
Extension (°)	19.9 ± 13.7	13.9 ± 11.7	–6.0 ± 12.9	**< 0.001**
Flexion (°)	122.3 ± 14.2	126.9 ± 11.6	4.6 ± 14.8	**0.02**
Flexion-Extension Arc (°)	102.5 ± 22.6	113.1 ± 20.2	10.6 ± 24.4	**< 0.001**
Supination (°)	79.3 ± 13.0	81.2 ± 8.5	1.9 ± 12.9	0.23
Pronation (°)	85.3 ± 7.7	85.0 ± 7.2	–0.3 ± 7.0	0.73
P-Intensity Score	54.0 ± 7.5	49.8 ± 6.6	–3.8 ± 9.8	**0.01**
P-Interference Score	62.9 ± 7.4	60.2 ± 7.3	–2.2 ± 8.1	0.05
P-UE Score	33.5 ± 11.8	38.6 ± 8.4	5.0 ± 13.2	**0.01**

*$p < 0.05$ bolded to indicate statistical significance. Paired t-tests used for significance testing between pre and post operative values. P-UE =PROMIS Upper extremity Function score; P-Interference = PROMIS Pain Interference score; P-Intensity = PROMIS Pain Intensity score; SD = Standard deviation.