



Patient factors influencing return to work and cumulative financial claims after clavicle fractures in workers' compensation cases

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Background: This study analyzed workers' compensation patients after surgical or nonoperative treatment of clavicle fractures to identify factors that influence the time for return to work and total health care reimbursement claims. We hypothesized that return to work for operative patients would be faster.

Methods: The *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnosis codes and *Current Procedural Terminology* codes were used to retrospectively query the Workers' Compensation national database. The outcomes of interest were the number of days for return to full work after surgery and total reimbursement for health care-related claims. The primary independent variable was treatment modality.

Results: There were 169 claims for clavicle fractures within the database (surgical, $n = 34$; nonoperative, $n = 135$). The average health care claims reimbursed were $\$29,136 \pm \$26,998$ for surgical management compared with $\$8366 \pm \$14,758$ for nonoperative management ($P < .001$). We did not find a statistically significant difference between surgical (196 ± 287 days) and nonoperative (69 ± 94 days) treatment groups in their time to return to work ($P = .06$); however, there was high variability in both groups. Litigation was an independent predictor of prolonged return to work ($P = .007$) and higher health care costs ($P = .003$).

Conclusion: Workers' compensation patients treated for clavicle fractures return to work at roughly the same time whether they are treated surgically or nonoperatively, with surgery being roughly 3 times more expensive. There was a substantial amount of variability in return to work timing by subjects in both groups. Litigation was a predictor of longer return to work timing and higher health care costs.

Level of evidence: Level II; Retrospective Design; Prognosis Study

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University of Rochester Office for Human Subject Protection granted approval for this study.

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Nonoperative management has historically been the preferred management strategy for displaced midshaft clavicle fractures. During the past few years, however, several studies have shown clinical improvement in patients managed with surgical fixation vs. those managed nonoperatively.^{3,5,8,10,11,21}

Other authors have demonstrated a significant nonunion rate as well as functional deficits in upper extremity strength and endurance in patients managed nonoperatively.^{12,16}

A recent cost-effectiveness analysis study demonstrated that the base case cost per quality-adjusted life-year for open reduction–internal fixation of a displaced midshaft clavicle fracture was \$65,000.¹⁴ A follow-up study evaluating cost and return to work in patients managed surgically vs. nonoperatively demonstrated that patients managed surgically had less chronic pain, less cosmetic deformity, and better functional outcomes and missed significantly fewer days of work.¹ This study also demonstrated an overall cost savings for surgical management compared with nonoperative management. However, this study had more workers' compensation patients in the nonoperatively managed group that trended toward significance, which could have significantly affected the return to work outcomes.

Workers' compensation patients have longer return to work and worse outcomes after injury compared with non-workers' compensation patients.^{4,13} Identifying variables that could be modified to improve outcomes and to get these patients back to work sooner with less health care expenditures would be of great societal benefit. The purpose of this study was to compare overall time to return to work and cumulative health care costs in a cohort of all-workers' compensation patients managed either nonoperatively or with surgical management for clavicle fractures. Our hypothesis was that surgical management of clavicle fracture in this population would result in earlier return to work.

Materials and methods

This study used the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) diagnosis codes and *Current Procedural Terminology* (CPT) codes to retrospectively query the Workers' Compensation national database managed by the University of Illinois, Chicago. Claims were identified for clavicle fractures (ICD-9: 810, 810.01, 810.02, 810.03, 810.1, 810.11, 810.12, 810.13) that were treated nonoperatively (CPT 23500) and those managed with surgical fixation (CPT 23515) between the years 2003 and 2013. The distribution of ICD-9 codes between treatment groups is presented in Figure 1. The outcomes of interest were the number of days for return to full work from the date of initial injury and the total reimbursement for health care–related claims (adjusted to 2013 dollars to account for inflation and log transformed to satisfy model assumptions). The primary independent variable was the type of management (nonoperative vs. surgical).

Pertinent variables extracted from the database were determined by the research team and senior author. These included age of the patient, marital status, gender, number of dependents, year of claim, injury mechanism, percentage impairment, use of vocational rehabilitation, presence of lawsuit, employment type (regular vs. not), length of employment, region within the United States, claim type (employer's liability vs. incident report), length of time missing from work, and job classification. Two categories (injury mechanism and job classification) required the grouping of many different descriptors into a few specific groups. Grouping was done to the best of the authors' ability based on the information from the database. Injury mechanisms were divided into the following groups: motor vehicle related, direct trauma from pushing/pulling/lifting, falls, and unable to be determined (unknown). Job classifications were

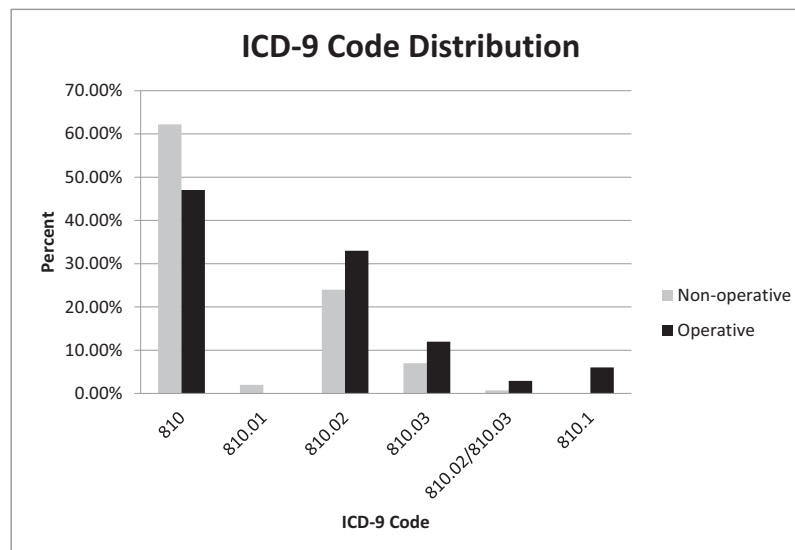


Figure 1 The distribution of *International Classification of Diseases, Ninth Revision (ICD-9)* codes between operative and nonoperative groups.

810.00—Closed fracture of clavicle, location unspecified

810.01—Closed fracture of medial clavicle

810.02—Closed fracture of clavicle shaft

810.03—Closed fracture of distal clavicle

810.1—Open clavicle fracture, unspecified location

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