Patients Face Three Times Higher Out-of-Pocket Expenditure with Surgical Management of Shoulder Instability when Compared to Nonsurgical Management

Justin Tiao, Kevin C Wang, Ashley Rosenberg, Timothy Hoang, Michael Matthew Herrera, Nicole Zubizarreta[1], Jashvant Poeran[2], James N Gladstone[3], Shawn G Anthony
[1]Icahn School of Medicine At Mount Sinai, [2]Mount Sinai, [3]Mount Sinai Health System

INTRODUCTION:

Recurrent anterior glenohumeral instability commonly occurs following shoulder dislocation, particularly among the younger patient populations. Arthroscopic Bankart repair is the most common surgical management of shoulder instability. Nonsurgical management of shoulder instability involves immobilization and physical therapy (PT). However, in younger patients and in overhead athletes, the risk of redislocation after nonsurgical treatment is as high as 90%. Despite these risks, previous investigations have shown that out-of-pocket cost is a major factor in patient decision making regarding pursuing stabilization procedures.

Recurrent shoulder dislocations have been reported to be costly; the average cost of a shoulder stabilization surgery was $7,807, and a closed reduction of a shoulder dislocation in the emergency department was $2,207. Understanding the out-of-pocket cost differential between surgical, nonsurgical, and conversion cases may help providers better counsel their patients regarding treatment of these injuries.

Our primary objective was to understand patient payments associated with surgical versus nonsurgical treatment of shoulder instability. Secondarily, we aimed to understand the costs associated with conversion from nonsurgical to surgical treatment.

METHODS: This study identified patients with shoulder instability in a 2013-2018 US large healthcare database. Patients under age 40 were included. From these identified patients, 3 cohorts were created; 1) surgical cohort: patients without any shoulder related preoperative PT, 2) nonsurgical cohort: patients with 2 or more instances of shoulder related PT and no instance of surgical CPT codes within the first year of diagnosis, and 3) conversion cohort: patients that had preoperative PT and then surgery within 1 year of initial diagnosis. Patient payments were calculated by summing up patient out-of-pocket expenditures for each claim billed with a shoulder instability diagnosis code from date of diagnosis through 1) 6 months after surgery for the operative and conversion cohorts and 2) 18 months after diagnosis for the nonsurgical cohort. Expenditures were broken down into computed tomography (CT), magnetic resonance imaging (MRI), x-ray, nerve block, and PT. Mean and standard deviation are reported. Patient characteristics and expenditures between operative and nonsurgical cohorts were compared using standardized differences (Std Diff) as their sample sizes were large. Standardized differences above 0.1 were considered significant. Surgical procedure type and patient payments were compared between the surgical and conversion cohorts using Mann Whitney U analysis as the sample size for the conversion cohort was small. Significance was set at $p < 0.05$.

RESULTS:

Patients in the surgical (n=1,577) and nonsurgical (n=2,674) cohorts were similar in terms of comorbidities and insurance type (Std Diff < 0.1 for both). However, they significantly differed in age, sex, and geographical region (Std Diff > 0.1). Patients in the surgical cohort were more likely to be male (percentage of males in the cohort: 72% vs 66%) and younger (mean age: 24 vs 27) than those in the nonsurgical cohort.

Compared to the conversion cohort (n=172), the operative cohort had significantly higher rates of undergoing bone block (5.90% vs. 2.33%) and open procedures (4.31% vs. 4.07%), and lower rates of arthroscopy procedures (89.54% vs. 93.51%) ($p < 0.001$ for all). PT payments and total payments were higher for the conversion cohort (PT: $437 vs. $373) (total: $2,014 vs. $1,547) than the operative cohort ($p < 0.001$ for both).

The surgical and nonsurgical cohort had similar patient payments for CT scans ($160 vs. $149, Std Diff = 0.043) and MRI ($241 vs. $240, Std Diff = 0.002). However, patients in the surgical cohort had higher PT payments ($373 vs. $295, Std Diff = 0.146) and higher total payments ($1,547 vs. $694, Std Diff = 0.615).

Analysis of the time from diagnosis to intervention found that the nonsurgical cohort had a median (IQR) of 20 days between diagnosis to the first PT visit. The conversion group had 124 days (64-206) and the operative group had 50 days (23-107) between diagnosis to procedure.

DISCUSSION AND CONCLUSION: This study shows that nonsurgical treatment of shoulder instability results in a much smaller financial burden to the patient. Patient payments were ~3 times less than when patients were treated nonsurgically as opposed to operatively. However, in patients who failed nonsurgical treatment, there was a much greater cost burden to patients compared to immediate surgical treatment initially. Patients who were male and on the younger side were more likely to receive immediate operative treatment likely due to increased risk of recurrent instability. The difference in patient out of pocket cost was ~$900 greater in patients who pursued immediate operative treatment compared to nonsurgical management. This would likely be a factor in initial patient decision making. However, with the additional cost burden on patients who convert from nonsurgical to surgical treatment (~$500 greater than immediate

operative treatment) along with the evidence that shows a high rate of redislocation following nonsurgical treatment, pursuing immediate operative treatment may be a better financial decision for the patient.

Table 1. Baseline Characteristics of the Operative, Non-operative, and Conversion cohorts. Mean age, sex breakdown, diagnosis year breakdown, DEYO comorbidity index breakdown, comorbidity breakdown, insurance breakdown, and regional breakdown are reported for each cohort. Standardized differences were calculated to compare the aforementioned baseline characteristics between the operative and non-operative cohorts. Significant differences (Std. Diff. > 0.1) are indicated in bold text.
Abbreviations: Standard deviation (SD), Deyo-Charlson Comorbidity Index (DCCI), Chronic obstructive pulmonary disease (COPD), Exclusive Provider Organization (EPO)/Preferred Provider Organization (PPO), High Deductible Health Plan (HDHP)/Consumer Directed Health Plan (CDHP), Health Maintenance Organization (HMO)/Point of Service (POS).

	Operative (n=1577)	Non-operative (n=2674)	Conversion (n=172)	Standardized Differences (Operative vs Non-operative)
Age, mean (SD)	24 (6)	27 (7)	25 (7)	**0.346**
Sex, male (%)	1141 (72.35)	1758 (65.74)	106 (61.63)	**0.143**
Diagnosis Year (%)				**0.466**
2014	211 (13.38)	696 (26.03)	21 (12.21)	
2015	427 (27.08)	930 (34.78)	48 (27.91)	
2016	511 (32.40)	476 (17.80)	57 (33.14)	
2017	428 (27.14)	572 (21.39)	46 (26.74)	
DCCI Index (%)				0.087
0	1519 (96.32)	2633 (98.47)	164 (95.35)	
1	57 (3.61)	35 (1.31)	8 (4.65)	
Comorbidities (%)				
Obesity	27 (1.71)	16 (0.60)	3 (1.74)	**0.104**
Smoking	29 (1.84)	38 (1.42)	1 (0.58)	0.033
COPD	48 (3.04)	26 (0.97)	7 (4.07)	**0.148**
Osteoporosis	60 (3.81)	23 (0.86)	4 (2.33)	**0.196**
Insurance Type (%)				0.099
EPO/PPO	911 (57.77)	1483 (55.09)	95 (55.23)	
HD/CDHP	338 (21.43)	580 (21.69)	42 (24.42)	
HMO/POS	263 (16.68)	544 (20.34)	29 (16.86)	
Other	65 (4.12)	77 (2.88)	6 (3.49)	
Region (%)				**0.204**
Northeast	269 (17.06)	635 (23.75)	27 (15.70)	
Midwest	361 (22.89)	671 (25.09)	46 (26.74)	
South	628 (39.82)	881 (32.95)	68 (39.54)	
West	319 (20.23)	487 (18.21)	31 (18.02)	

Table 2. Procedure Type and Patient Payment Breakdown for Operative, Non-operative, and Conversion cohorts. Operative and conversion cohorts were categorized into the following procedure types: arthroscopy, bone block, open procedure, or other. The patient payments for each cohort were broken down into the following expenditure categories: CT scan, MRI scan, X-ray, nerve block, physical therapy, and other. "Other" payments included claims that were identified in less than 50% of the patient cohort. Total patient payment is also reported. Mann Whitney U analysis was used to compare procedure type breakdown and mean payment breakdown between the operative and conversion cohorts. Standardized differences were calculated to compare mean payment breakdown between the operative and non-operative cohorts. Significant difference ($p < 0.05$ and Std. Diff. > 0.1) are indicated in bold text.

	Operative (n=1577)	Non-operative (n=2674)	Conversion (n=172)	P-Value (Operative vs. Conversion)	Standardized Differences (Operative vs Non-operative)
Procedure Type (%)				**<0.001**	-
Arthroscopy	1412 (89.54)	-	161 (93.61)		-
Bone Block	93 (5.90)	-	4 (2.33)		-
Open	68 (4.31)	-	7 (4.07)		-
Other	4 (0.25)	-	-		-
Mean Payment, $ (SD)					
CT Scan	51 (258)	149 (269)	138 (210)	0.6201	0.043
MRI Scan	241 (381)	240 (381)	257 (360)	0.8256	0.002
X-ray	48 (105)	56 (119)	37 (74)	0.2697	0.078
Block	51 (126)	-	36 (97)	-	**0.207**
Physical Therapy	373 (540)	295 (523)	437 (578)	**<0.001**	**0.146**
Other Cost	1323 (1573)	338 (678)	1450 (1577)	**<0.001**	**0.813**
Total Cost	1547 (1702)	694 (989)	2014 (1841)	**<0.001**	**0.613**