



The financial burden associated with multiple shoulder dislocations and the potential cost savings of surgical stabilization



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Introduction: Shoulder dislocation is a costly problem and can have a high risk for recurrent instability after initial dislocation based on well-defined patient characteristics. Patients with recurrent instability can be treated with shoulder stabilizing procedures. Although more costly, surgery may decrease the overall health care burden of managing a patient with multiple shoulder dislocations nonoperatively.

Methods: We performed a retrospective chart review of all patients who presented to the emergency department (ED) with a diagnosis of a shoulder dislocation at a level 1 academic trauma center during the year 2016. Patient information regarding the current dislocation episode, previous dislocations, shoulder surgeries, and postreduction follow-up was gathered. These data were then used to determine the average cost of an ED presentation for a shoulder dislocation episode as obtained from the hospital finance department. The average cost of shoulder stabilization surgery was used to conduct a cost-benefit analysis of operative vs. nonoperative management.

Results: Data were collected on 104 individuals who presented to the ED with shoulder dislocations. Of these, 65 were primary dislocations and 39 were recurrent dislocations. Twelve patients underwent shoulder stabilization surgery after their ED presentation. The average cost to the institution for an ED visit requiring the closed reduction of a shoulder dislocation was \$2207 (\$973.21 without sedation and \$3744 with conscious sedation). The average cost of a shoulder stabilization procedure performed at this same institution was \$7807.

Discussion and conclusion: Although shoulder stabilization has a higher cost on the front end, this intervention results in cost savings if it prevents 2-3 future shoulder dislocations resulting in ED visits. These findings suggest that, for patients with a high risk for recurrent instability, not only would stabilization surgery help prevent subsequent dislocation events but would also minimize health care costs.

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Primary traumatic anterior glenohumeral shoulder dislocations are common injuries.^{9,10,14-16,19,20} The overall incidence rate varies between 11.2 and 23.9 per 100,000 people each year.^{1,5,10,16,20} Over the past 10 years at our institution, there have been 2186 (approximately 210/yr) separate hospital encounters due to shoulder dislocations. These patients often require treatment consisting of shoulder reduction using local anesthesia, conscious sedation, or general anesthesia in an urgent care or emergency department (ED) setting. In addition to reduction, these patients

also incur costs related to orthopedic consultation, multiple radiographs, bracing, physical therapy, and lost time at work.

Shoulder dislocations, for younger male patients, can carry an increased risk of recurrent instability.^{2,5,6,8,10,13-17,19} The risk of recurrent instability after an initial shoulder dislocation treated nonoperatively has been reported in some studies to be extraordinarily high (26%–90%).^{1,3,4,6,9,10,19} Recurrent instability events result in recurrent ED visits for additional reductions in the following weeks, months, or years.

An alternative treatment to nonoperative management for first-time dislocators in high-risk patients is stabilization surgery (ie, arthroscopic Bankart repair or Latarjet procedures, which have re-dislocation rates of 10% and 5%, respectively).^{3,7,10,12,13} Stabilization surgeries have a higher initial cost; however, when compared with the costs accrued after multiple re-dislocations, they may decrease the overall health care burden of managing a high-risk patient after glenohumeral shoulder dislocation.^{11,13} To assess this theory, we

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compared the health care costs associated with the nonsurgical and surgical management of patients who experienced single and recurrent episodes of anterior glenohumeral shoulder dislocation. We hypothesized that the cost of the surgical procedure would be lower than multiple ED visits for shoulder dislocations.

Methods

During this institutional review board–approved retrospective chart review study at our level 1 academic trauma center, patients who presented to the ED with a shoulder dislocation in 2016 were identified in our electronic medical record (Epic, Verona, WI, USA) using CPT code (23650). The chart review was performed to identify patient biographic information (age, sex, body mass index, medical history), surgical history, dislocation history, time spent in the ED, orthopedic consultation, number of shoulder radiographs performed, type of anesthesia for reductions (intra-articular block, conscious sedation, general anesthesia), neurovascular status before and after reduction, provision of sling, scheduled surgery, and date of last follow-up. Radiographs were reviewed to assess for associated Bankart and Hill-Sachs lesions and greater tuberosity fracture.

Hospital costs were determined using cost information for a non–patient-specific episode obtained from the hospital financial department. For the cost of shoulder dislocation, these included cost of average conscious sedation in the ED, cost of average shoulder radiograph, cost of time in the ED, and other supply costs. The direct intraoperative cost of shoulder stabilization procedures (ie, Latarjet and Bankart repair) was also obtained using a combination of costs including average perioperative costs, bed costs, pharmacy costs, costs of any imaging, procedure costs, and costs for any supplies. Using these data, a cost-comparison analysis was constructed to assess shoulder stabilization surgery as a preventative measure compared with the costs that would be incurred during treatment for subsequent shoulder dislocations in the ED.

Results

During 2016, 104 individual patients (63.5% male, age 42.5 years, 95% confidence interval [CI]: 38.4–46.6 years) presented to the ED with shoulder dislocations. Sixty-five (62.5%) were primary dislocators, 39 (37.5%) patients had at least 1 prior dislocation, and 14 (13.5%) of the patients reported a history of shoulder surgery. Five (4.8%) patients reported a history of epilepsy.

Those with recurrent dislocations were significantly younger (recurrent: 34.4 years, 95% CI: 32.1–36.7 vs. primary: 47.0 years, 95% CI: 44.1–49.9). Regression analysis revealed that younger patients were significantly more likely to experience repeated dislocations ($P = .002$, $r^2 = 0.002$).

Patients with multiple dislocations had an average of 3.5 prior dislocations (95% CI: 2.7–4.2) and 2.7 prior recorded ED visits for dislocations in the EMR (95% CI: 2.0–3.5). Twenty-one (20.2%) patients reported 3 or more prior dislocations, and 12 (11.5%) patients had 3 or more presentations to our ED for shoulder dislocations.

The main mechanism of dislocation for patients presenting with primary dislocations was a fall in 55.4% and for those with recurrent dislocations “another/unknown” cause in 66.7%, which were significantly different ($P < .05$; Table I). Associated injuries included a Bankart lesion in 79 (75.9%) patients, Hill-Sachs deformity in 66 (63.5%), and a greater tuberosity fracture in 14 (13.5%). Four (3.8%) patients had a neurologic deficit before reduction, 2 of which resolved after reduction.

The workup of these patients included an average of 5.1 radiographs, 5.4 hours (95% CI: 4.3–6.6 hours) in the ED, and orthopedics

Table I

Mechanism of injury compared between those with primary and recurrent dislocations

	Primary dislocation (n = 65), n (%)	Recurrent dislocation (n = 39), n (%)	P value
Fall	36 (55.4)	9 (23.1)	.001
MVA	6 (9.2)	2 (5.1)	.447
Direct blow	1 (1.5)	2 (5.1)	.291
Pedestrian struck	3 (4.6)	0 (0.0)	.173
Other	19 (29.2)	26 (66.7)	<.001

MVA, motor vehicle accidents.

Table II

Method of anesthetic for reduction compared between those with primary and recurrent dislocations

	Primary dislocation (n = 65), n (%)	Recurrent dislocation (n = 39) n (%)	P value
Intra-articular block	30 (46.2)	21 (53.8)	.447
Conscious sedation	28 (43.1)	13 (33.3)	.325
General anesthesia	6 (9.2)	3 (5.8)	.787

consultation in 33 cases (31.7%). To facilitate shoulder reduction, 51 (49.0%) patients had an intra-articular block, 41 (39.4%) underwent conscious sedation, and 9 (8.7%) underwent general anesthesia. There were no significant differences between the method of anesthesia used for reduction in patients with a primary and a recurrent dislocation (Table II). The majority of the patients (86.5%) received a sling for postreduction immobilization. Twelve (11.5%) patients underwent shoulder stabilization surgery after their ED presentation.

The average institutional cost of the closed reduction of a shoulder dislocation was \$973 without sedation and \$3744 with conscious sedation, bringing the average cost of shoulder dislocation in our study to \$2207. This average does not take into account the individuals who underwent general anesthesia to aid with reduction. The average cost of a shoulder stabilization procedure performed at this same institution in 2016 was \$7807 (\$7852 for Latarjet and \$7784 for Bankart repair).

Discussion

This study aimed to examine the financial cost associated with shoulder dislocations in patients presenting with recurrent dislocations. We examined the hospital-incurred costs associated with both operative and nonoperative management of shoulder dislocation/glenohumeral instability and found that, on average, shoulder stabilization surgeries were more costly initially, but with each prevented ED visit, saved \$2207. This means that after 2–3 “prevented” future visits, the cost of repeated dislocations becomes greater than the cost of surgical management. These findings demonstrate that if patients are at a high risk of recurrent instability and future ED visits that require relocation, early stabilization surgery may be more cost-effective than nonoperative management.^{11,18}

As has been demonstrated in previous studies, our study found that younger patients were more likely to have repeat dislocations as compared with older patients ($P < .05$).^{7,9,10,13–17,20} Although the average age of 42 is more than what would be expected for shoulder dislocations, the largest percentage of dislocators were men in the 20–30 years of age range, which made up 38.5% of the

total patient population and 47.5% of those with recurrent dislocations.^{7,16,20}

The majority of the patients in this study were first-time dislocators, which is consistent with prior studies showing that the rate of recurrent shoulder instability after initial dislocation is roughly one-third.¹⁰ Because this study only recorded each patient's most recent ED visit for a shoulder dislocation, the percentage of repeat dislocations treated over the course of the study period was underestimated. In addition, the average number of dislocations for those who had a previous dislocation was 3.5, which further emphasizes the cost savings potential with early intervention in high-risk patients. To illustrate this point, during the study year, the hospital cost of treating patients in the ED with recurrent dislocations was more than \$200,000 (excluding patients who underwent general anesthesia for reductions). With increased emphasis being placed on efficient resource utilization, cost savings, in the setting of more stringent reimbursements, surgical procedures such as Bankart repair may not only improve the patient's quality of life but may also provide overall health care cost savings to the patient at high risk for redislocation.

Limitations of the study were its retrospective design and the inability to track these patients' visits to EDs outside of our hospital system, potentially undervaluing the overall health care burden of recurrent dislocators. In this study, we examined only hospital-incurred cost, which excluded costs related to physical therapy, outpatient office visits, costs to patients, and societal costs, which can be substantial.¹⁸ Another limitation was the inevitable inclusion of patients with multidirectional instability and patients who presented to the ED for secondary gain, which would have less predictable options after simple stabilization surgery. The inclusion of these patients could have led to an overestimation of the average number of dislocations and the cost savings of operative intervention.

Further research is required and should focus on the effects of an orthopedic consult and orthopedic follow-up on the occurrence of repeat dislocations as well as the number of patients who are offered and ultimately elect to undergo stabilization procedures. With these data, we would be able to more completely assess the potential cost savings of shoulder stabilization surgery for those with a high risk of shoulder instability after initial dislocation.

Conclusion

This study further demonstrates that for patients who are considered high risk for redislocation or recurrent shoulder instability, surgical stabilization after the initial dislocation may confer an additional benefit of cost savings in addition to decreasing the risk of redislocation.^{2,5,7,11}

Disclaimer

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