

Nonoperative Management of Posterior Shoulder Instability: What Are the Long-Term Clinical Outcomes?

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Abstract

Objective: To report the injury characteristics, radiographic findings, and long-term outcomes of nonoperative management for posterior shoulder instability (PSI). **Design:** A retrospective review of 143 patients with PSI using a large geographic database. **Setting:** Single county between January 1994 and July 2012. **Patients:** A clinical history and diagnosis of PSI, one confirmatory imaging study to support the diagnosis, and a minimum of 5 years follow-up were required for inclusion. Patients with seizure disorders, anterior-only instability, multidirectional instability, and superior labrum from anterior to posterior diagnosis were excluded. **Interventions:** Patients with PSI were managed nonoperatively or operatively. **Main Outcome Measures:** Pain, recurrent instability, and progression into glenohumeral osteoarthritis at long-term follow-up. **Results:** One hundred fifteen patients were identified. Thirty-seven (32%) underwent nonoperative management. Twenty (54%) patients were diagnosed with posterior subluxation, 3 (8%) with a single dislocation, and 7 (19%) with multiple dislocations. Symptomatic progression of glenohumeral arthritis was observed in 8% (3) of patients. Pain improved in 46% (17) of patients and worsened in 19% (7). Recurrent instability and progression to osteoarthritis occurred in 15% (3/20) of patients with a traumatic instability event compared with 0% of atraumatic patients after nonoperative management ($P = 0.234$). Pain at follow-up was more common in nonoperative than operative patients ($P = 0.017$). **Conclusions:** Nonoperative management is a viable option for many patients with posterior shoulder instability; however, many may continue to have posterior shoulder pain.

Key Words: posterior shoulder instability, posterior shoulder dislocation, posterior labrum, posterior labral tear, nonoperative treatment

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INTRODUCTION

Posterior shoulder instability (PSI) is an uncommon condition that represents approximately 2% to 10% of all glenohumeral instability events.^{1,2} Posterior shoulder instability is characterized by posterior translation of the humeral head relative to the glenoid, ranging from small subluxation episodes to overt dislocation. The pathogenesis is multifactorial in nature and relatively infrequent compared with anterior shoulder instability, and as such, patients are more likely to experience misdiagnosis or a delay in diagnosis as a result of nonspecific symptoms such as pain and weakness rather than gross instability.^{3–5} However, PSI has become an increasingly recognized source of shoulder pain and disability, most commonly reported in the young athletic population, including weightlifters and athletes in contact and overhead sports.^{4–7} Posterior shoulder instability is initially managed with conservative treatment involving activity modification and physical

therapy to improve scapulothoracic mechanics and strengthen the dynamic shoulder stabilizers, including the rotator cuff muscles, posterior deltoid, and long head of the biceps.⁸ Risk factors associated with an increased risk of recurrent instability include primary dislocation before aged 40 years, dislocation due to a seizure, large reverse Hill–Sachs lesions, glenoid retroversion, and increased external rotation strength.^{9,10}

Current literature regarding PSI provides well documented insights into the excellent patient outcomes after arthroscopic posterior stabilization. A systematic review and meta-analysis by DeLong et al¹¹ reported that patients treated arthroscopically have low rates of recurrent instability (8%), low rates of revision procedures (8%), low rates of persistent pain (12%), excellent subjective stability (91%), and high rates of return to sport (92%, although only 67% returned to preinjury level of play). Furthermore, this review reported that patients treated arthroscopically have superior and more reliable outcomes than those treated with open stabilization procedures.

However, there remains a paucity of studies evaluating nonsurgical management of PSI with long-term outcomes. Blacknall et al¹² reported a statistically significant improvement in outcome scores after physical therapy for treatment of 19 patients with atraumatic posterior shoulder subluxation. Other literature has demonstrated nonsurgical management to be less successful compared with operative treatment for patients with posterior instability and labral pathology secondary to traumatic events.^{13–15}

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Overall, more studies reporting long-term patient outcomes after nonsurgical management of PSI are needed to increase our knowledge on the topic and help delineate which patients can successfully be treated with nonoperative management. Therefore, the purpose of this study was to (1) report demographics and injury characteristics for patients treated nonoperatively for PSI, (2) describe long-term clinical and radiographic outcomes for nonoperative treatment of PSI, and (3) compare those results to patients undergoing surgical management.

MATERIALS AND METHODS

After approval of Institutional Review Boards of the Mayo Clinic and Olmsted Medical Center (16-007084 and 042-OMC-16), patients who had a primary diagnosis of PSI between January 1, 1994 to July 31, 2012, were identified using the Rochester Epidemiology Project (REP). The REP provides comprehensive medical records for all residents of Olmsted County, MN, and neighboring counties from 1966 to present. This geographic database has been previously described and validated and allows for the capture of all patient medical records and procedures within its catchment area, independent of treating institution. Using the *International Classification of Diseases-9* diagnosis codes consistent with shoulder instability, patients were queried, and medical records were independently reviewed to confirm the diagnosis of PSI.

Inclusion criteria consisted of (1) a clinical history and diagnosis of PSI, (2) one confirmatory imaging study to support the diagnosis, and (3) a minimum of 5 years follow-up. Exclusion consisted of patients with (1) seizure disorders, (2) anterior-only instability, (3) multidirectional instability, and (4) superior labrum from anterior to posterior diagnosis. Patient demographics, medical history, physical examination findings, imaging results, and treatment details were recorded. Confirmatory imaging was defined as either magnetic resonance imaging or arthrogram (MRI/MRA) demonstrating a posterior labral tear, an axillary radiograph demonstrating posterior glenohumeral dislocation, or a computed tomography arthrogram demonstrating a posterior labral tear. Radiologist reports were used to define labral tears reported on MRI. If there was no preoperative imaging on record, an operative report describing detachment of the posterior labrum was used as a confirmation of PSI. Patient records were reviewed for a treatment method and were classified as either operative or nonoperative. Operative management was defined as arthroscopic stabilization of the labrum through repair using anchors or debridement without anchor placement. Clinically symptomatic arthritis was defined as the presence of arthritic symptoms significant enough to warrant seeking physician intervention and obtaining radiographs.

Descriptive statistics were used for patient demographics, including means, ranges, and percentages, when appropriate. Student *t* tests were used to evaluate for significance when comparing outcomes between surgical and nonsurgical subgroups. The level of statistical significance was set to $\alpha = 0.05$. All analyses were performed using JMP software (version 13, SAS Institute Inc, Cary, NC).

RESULTS

After review of all records, 115 patients (101 men and 14 women) with new onset PSI and 5 or more years of clinical follow-up were identified and included in the analysis. Of

these 115 patients, 37 (32%) (mean age 29.2 years, range 12.7-54.3 years) were treated without surgery and 78 (68%) patients (mean age 28.8 years, range 10.5-58.2 years) were treated surgically (Figure 1). Demographics are further summarized in Table 1.

The nonoperative cohort consisted of 32 men and 5 women followed for a mean of 13.9 years (range, 5-23 years). There were 19 (51%) smokers, 6 (16%) heavy laborers, and 3 (8%) diabetic patients with a mean body mass index of 27.2 kg/m² (range, 18.1-40.6). Regarding sport participation, 9 (24%) patients were contact athletes (defined as weightlifting, football, rugby, wrestling, etc.), 9 (24%) overhead athletes (defined as volleyball, throwing, swimming, rock climbing, etc.), and 19 (51%) nonathletes. Of these 37 patients, 20 (54%) reported a distinct, inciting traumatic event, whereas 17 (46%) reported atraumatic instability. In terms of dislocations, 3 (8%) patients had one posterior shoulder dislocation, 7 (19%) had multiple dislocations, and 27 (73%) had no report of dislocation.

Regarding radiographic findings, 1 (3%) nonoperative patient had osteoarthritis at baseline (Table 2). Progression of symptomatic osteoarthritis was demonstrated in this patient and 2 others, totaling 3 (8%) patients at final follow-up. Thirty-four (92%) nonoperative patients underwent an MRI after PSI, with 21% (7 of 34) demonstrating a posteroinferior labral tear, 26% (9 of 34) demonstrating a posterosuperior tear, and 47% (16 of 34) had a combination of both. One patient (3%) had a reverse Hill-Sachs lesion and 2 (6%) had a reverse bony Bankart lesion.

At long-term follow-up, 46% (17) of nonoperative patients had improved pain, 35% (13) reported the same level of pain, and 19% (7) reported worsening of pain (Table 3). However, despite the same or worsened levels of pain reported in 54% (20) of patients, none converted to surgery. Overall, 8% (3) of nonoperative patients experienced a recurrent episode of instability. Of the 20 nonoperative patients reporting an initial acute traumatic instability event, 20% (4) had moderate-to-severe pain at final follow-up compared with 6% (1 of 17) of patients with atraumatic instability ($P = 0.460$). Recurrent instability occurred in 15% (3) of nonoperative patients with a traumatic instability event compared with 0% of atraumatic nonoperative patients after nonoperative management ($P = 0.234$). Of those treated nonoperatively, arthritis progression occurred in 15% (3) of patients with a traumatic instability event compared with 0% of atraumatic patients ($P = 0.234$).

In comparison, 3 (4%) of the patients undergoing surgery had osteoarthritis at baseline. At final follow-up, 13 (17%) surgical patients had new development or progression of osteoarthritis. Surgical patients had more severe MRI findings, with 58% (44 of 76) demonstrating a posteroinferior labral tear, 71% (54 of 76) demonstrating a posterosuperior tear, and 51% (39 of 76) with tears in both locations. Furthermore, 6 patients (8%) had reverse Hill-Sachs lesions and 5 had a reverse bony Bankart lesion. At final follow-up, operative patients had significantly lower levels of pain compared with nonoperative patients ($P = 0.017$), with 62% (48) demonstrating improved pain, 27% (21) experiencing the same level of pain, and 12% (9) demonstrating worsened pain, compared with 46%, 35%, and 19% of nonoperative patients, respectively. Within the 49 operative patients reporting an initial acute traumatic instability event, only 8% (4) had moderate pain compared with 14% (4 of 29) of patients with atraumatic instability ($P = 0.071$). After

TABLE 1. Patient Demographics and Characteristics

	Nonoperative	Operative
Number (%)	37 (32.2)	78 (67.8)
Mean age	29.2 (12.7-54.3)	28.8 (10.5-58.2)
Sex, n (%)		
Male	32 (86.5)	69 (88.5)
Female	5 (13.5)	9 (11.5)
Body mass index	27.2 (18.1-40.6)	27.5 (12.3-40.0)
Smoker, n (%)	19 (59.4)	35 (44.9)
Diabetes mellitus, n (%)	3 (8.1)	2 (2.6)
Laborer, n (%)	6 (16.2)	16 (20.5)
Sport, n (%)		
Contact	9 (24.3)	23 (29.5)
Overhead	9 (24.3)	24 (30.8)
Nonathlete	19 (51.4)	30 (38.5)

surgery, progression of arthritis occurred in 19% (9 of 48) of patients with traumatic instability compared with 14% (4 of 28) of atraumatic patients ($P = 0.903$). Overall, progression of osteoarthritis occurred in 8% (3) of nonoperative patients and 17% (13) of operative patients ($P = 0.470$).

DISCUSSION

Posterior shoulder instability is a relatively infrequent condition with limited available literature regarding best treatment practices. Previous studies have demonstrated good-to-excellent outcomes after surgical stabilization for posterior instability.^{7,11,16} Long-term results after nonoperatively treated PSI are unclear and are lacking in the literature, with recent evidence demonstrating promising results from nonoperative treatment of patients with an atraumatic episode of instability.^{12,14,17} The major findings of this study include a

low rate of osteoarthritis progression (8%) and a low rate of recurrent instability (8%) after nonoperative management at long-term follow-up. However, only 46% of patients had improved pain at a mean follow-up of 13.9 years.

In this study population, less than one-third (32%) of patients diagnosed with PSI were treated nonoperatively over long-term follow-up. This finding is similar to other studies in which 22% to 37% of patients with posterior instability were treated nonoperatively.^{18,19} Most nonoperatively treated patients were men (86%), an average age of 29.2 years old, half were athletes (49%), and half experienced an inciting traumatic event (54%). In addition, only 27% of patients in this study presented with a dislocation event, whereas 73% presented subluxation. These patient demographics are consistent with that of previous studies on nonoperative management of PSI.^{13,14} It is important to note that several of these demographics differ from surgically treated patients because previous literature has demonstrated nonoperative management as less likely to be successful in patients with PSI after a traumatic event.^{6,14} Specifically, the nonoperative group is a lower demand group (Table 1) and has less pathology (Table 2). Therefore, literature regarding surgically treated patients often includes a higher proportion of patients who experienced traumatic PSI.^{15,20}

Progression of symptomatic glenohumeral arthritis was demonstrated in only 8% of patients over a long-term follow-up of 13.9 years. Because of the short-term follow-up reported in the literature focused on PSI, progression to osteoarthritis has not been previously reported and comparisons are limited. In a 10 years prospective study by Hovelius et al²¹ regarding anterior shoulder instability, 11% and 9% of patients demonstrated mild or moderate to severe arthropathy, respectively. After 25 years follow-up, Hovelius et al²² showed 56% of patients demonstrated progression of arthropathy. However, there are a number of factors that likely account for the discrepancy in progression to osteoarthritis between these studies. In our study, only symptomatic arthritis was analyzed. In the prospective studies by Hovelius et al,^{21,22} almost all patients were radiographically evaluated for osteoarthritis, even if they were asymptomatic. In addition, the mechanism by which anterior and posterior instability occurs is often different. Although anterior shoulder

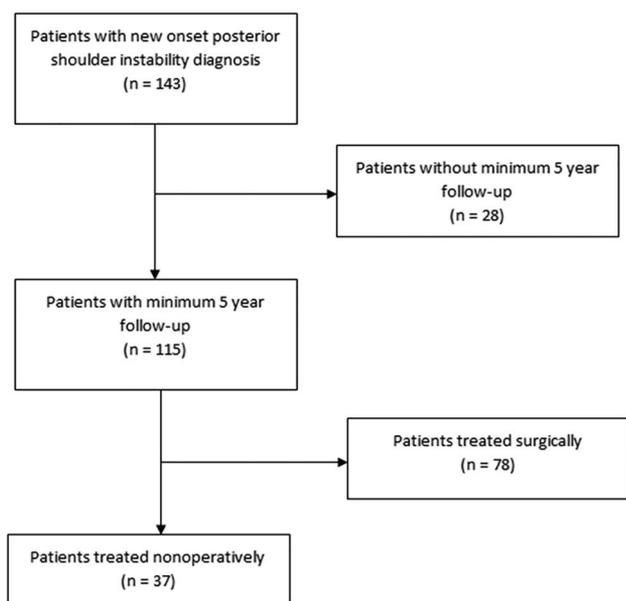


Figure 1. Flowchart demonstrating study patient selection.

TABLE 2. Injury and Imaging Characteristics

	Nonoperative	Operative
Acute trauma, n (%)	20 (54.5)	49 (62.8)
Previous posterior dislocation, n (%)		
None	27 (73.0)	61 (78.2)
Single	3 (8.1)	10 (12.8)
Multiple	7 (18.9)	7 (9.0)
MRI findings, n (%)		
Number	34 (91.9)	76 (97.4)
Posteroinferior labral tear	7 (20.6)	44 (57.9)
Posterosuperior labral tear	9 (26.5)	54 (71.1)
Both	16 (47.1)	39 (51.3)
Reverse Hill–Sachs	1 (2.9)	6 (7.9)
Reverse bony Bankart	2 (5.8)	5 (6.6)

dislocations often occur after a traumatic event, posterior shoulder instability occurs more commonly secondary to repeated microtrauma.^{6,23} This mechanism likely leads to decreased cartilage damage and lower rates of progression to osteoarthritis after PSI.

At final follow-up, 46% of nonoperative patients demonstrated an improvement in pain from their initial visit, 35% had the same level of pain, and 19% reported worsening of pain. Similarly, Fronek et al¹³ reported 50% of patients experience pain improvement after nonoperative treatment for PSI. Furthermore, patients in their study who reported pain improvement tended to have moderate or severe pain at initial presentation, whereas those that did not report pain improvement tended to have only mild pain at presentation. In our study, 2 patients reported moderate-to-severe pain on initial presentation and both reported improved pain on final follow-up. Conversely, all patients who experienced progression of pain reported none or mild pain on initial presentation. This may be helpful in counseling patients and guiding treatment for these patients.

The rate of recurrent instability after nonoperative management was very low (8%) in this study. This finding is similar to that observed in patients after arthroscopic treatment of PSI in which recurrent instability rates varied from 4% to 12%.^{15,20,24} When comparing patients with traumatic to atraumatic PSI, there were no significant differences in recurrent instability or presence of moderate-to-severe pain at final follow-up. However, the comparisons in our study are likely underpowered because of the small study population. In comparison, Burkhead et al¹⁴ demonstrated that 94% of

patients who presented with atraumatic PSI had good-to-excellent results after nonoperative treatment in their study population, whereas only 36% of patients with traumatic PSI demonstrated good-to-excellent results.

There were a number of interesting differences in outcomes when comparing nonoperative and operative subgroups. First, there was no significant difference in rate of progression to symptomatic glenohumeral arthritis over long-term follow-up between operative and nonoperative patients ($P = 0.470$). This was in contrast to the work of Hovelius et al,²¹ which demonstrated a reduction in progression into glenohumeral osteoarthritis after surgical correction. This higher rate of arthritic progression seen in this study may be explained by more severe initial pathology and more frequent imaging occurring throughout the follow-up period in operative patients. In addition, at final follow-up, operative patients had significantly lower levels of pain than that of nonoperative patients ($P = 0.017$), with 61.5% of patients demonstrating improvement, 26.9% experiencing no change, and 11.5% experiencing worsening pain, compared with 46%, 35%, and 19% of nonoperative patients, respectively. This finding is largely consistent with the published literature and may represent an important consideration when ultimately choosing to manage PSI operatively or nonoperatively.^{11,13}

There were several limitations in this study that merit discussion. This was a retrospective, population-based study that relied on diagnosis codes to accurately capture this patient population, and the data were limited by what was available in the medical records. Although this is one of the larger patient series on nonoperative management of PSI in the

TABLE 3. Patient Outcomes

	Nonoperative	Operative
Pain, n (%)		
Improved	17 (46)	48 (61.5)
No change	13 (35)	21 (26.9)
Worsened	7 (19)	9 (11.5)
Baseline Osteoarthritis, n (%)	1 (2.7)	3 (3.8)
Progression of Osteoarthritis, n (%)	3 (8.1)	13 (16.7)
T-test: progression of Osteoarthritis associated with trauma	$P = 0.234$	$P = 0.906$

literature, it is likely not sufficiently powered to detect significant differences among all of the variables studied. Finally, although most of these patients had good outcomes, there is likely selection and treatment bias in that patients with worse symptoms or pathology were ultimately treated with surgery.

CONCLUSIONS

Patients with PSI managed nonoperatively demonstrated low rates of recurrent instability (8%) and low rates of progression to osteoarthritis (8%) over long-term follow-up. However, less than half (46%) of patients demonstrated an improvement in pain, whereas one-third (35%) reported the same level of pain. Accordingly, nonoperative management seems to be a viable treatment option for many patients with posterior shoulder instability, although those presenting with mild pain are less likely to have significant improvement in their pain at long-term follow-up.

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