

Management of Primary Anterior Shoulder Dislocations Using Immobilization

Brent I. Smith, DHSc, ATC*; Kellie C. Huxel Bliven, PhD, ATC†; Genoveffa R. Morway‡; Jason G. Hurbanek, MD§

*ATI Physical Therapy, Bolingbrook, IL; †College of Graduate Health Studies, A.T. Still University, Mesa, AZ; ‡Department of Physical Education, Denison University, Granville, OH; §Hinsdale Orthopaedic Associates, Joliet, IL. Dr Smith is now at the Department of Kinesiology, The Pennsylvania State University, University Park.

Reference/Citation: Paterson WH, Throckmorton TW, Koester M, Azar FM, Kuhn JE. Position and duration of immobilization after primary anterior shoulder dislocation: a systemic review and meta-analysis of the literature. *J Bone Joint Surg Am.* 2010;92(18):2924–2933.

Clinical Question: Does an optimum duration and position of immobilization after primary anterior shoulder dislocation exist for reducing recurrence rates?

Data Sources: MEDLINE/PubMed, EMBASE, and Cochrane databases were searched up to December 2009 without limitations. The search terms for all databases used were *shoulder AND dislocation* and *shoulder AND immobilization*.

Study Selection: Criteria used to include articles were (1) English language, (2) prospective level I or level II studies (according to *Journal of Bone & Joint Surgery* guidelines), (3) nonoperative management of initial anterior shoulder dislocation, (4) minimum follow-up of 1 year, and (5) rate of recurrent dislocation as a reported outcome.

Data Extraction: A standardized evaluation method was used to extract data to allow assessment of methods issues and statistical analysis to determine sources of bias. The primary outcome was the recurrence rate after nonoperative management of anterior shoulder dislocation. Additional data extracted and used in subanalyses included duration and position of immobilization and age at the time of initial dislocation. Data were analyzed to determine associations among groups using 2-tailed Fisher exact tests. For pooled categorical data, relative risk of recurrent dislocation, 95% confidence intervals, and heterogeneity using the I^2 statistic and χ^2 tests were calculated for individual studies. The Mantel-Haenszel method was used to combine studies and estimate overall relative risk of recurrent dislocation and 95% confidence intervals. The statistical difference between duration of immobilization and position was determined using z

tests for overall effect. Pooled results were presented as forest plots.

Main Results: In the initial search of the databases, the authors identified 2083 articles. A total of 9 studies met all of the criteria and were included in this review. In most of the studies, age was a risk factor for recurrence. Patients less than 30 years of age were more likely to sustain a recurrent dislocation than patients more than 30 years of age. In 5 studies ($n = 1215$), researchers found no difference in recurrence of shoulder dislocation when immobilized in internal rotation (IR) for less than 1 week (41%, 40 of 97) compared with more than 3 weeks (37%, 34 of 93) in patients less than 30 years of age ($P = .52$). Authors of 3 studies ($n = 289$) compared the effect of immobilization in IR versus external rotation (ER), and whereas they found no statistical difference, a trend appeared toward reduced recurrence rates in ER but not IR ($P = .07$). The rate of recurrent dislocation was 40% (25 of 63) in patients treated with IR sling immobilization and 25% (22 of 88) in patients immobilized in ER.

Conclusions: Overall, the investigators found that younger age (<30 years) was a predictor of recurrent dislocations, immobilization for more than 1 week did not improve recurrence rates, and an apparent trend existed toward decreased recurrence rates with ER rather than IR. According to the review and meta-analysis by Paterson et al, the level of evidence for recommendations regarding optimal duration and position of immobilization to reduce the risk of recurrent dislocation was therapeutic level II. This level of evidence was appropriate because the review included only prospective studies of level I or II and a minimum follow-up of 1 year.

Key Words: glenohumeral joint, traumatic injuries, recurrence, immobilization position

COMMENTARY

Initial traumatic anterior glenohumeral dislocations have high recurrence rates. The joint articulations and high reliance on dynamic stabilizers place the shoulder at risk for dislocation with subsequent reinjury when intervention, including rehabilitation and protection, is inadequate after the primary episode. Patients may be presented with nonoperative and operative treatment

options. Surgery is 1 treatment option that may be recommended for young athletes involved in contact sports because of better outcomes, specifically lower recurrence rates^{1,2}; however, not every patient is a good surgical candidate. Nonoperative treatment commonly has included the use of a sling with the shoulder immobilized in internal rotation (IR) for a set period. In their magnetic resonance imaging study, Itoi et al³ showed minimal labral displacement on the glenoid rim

in external rotation (ER), which corroborates recent suggestions^{4,5} that immobilizing the shoulder in ER may improve labral coaptation for better healing and provide better outcomes by reducing recurrence rates; however, differences in populations and health care systems may be contributing factors that should be considered.

The prevalence of primary anterior glenohumeral dislocations is high in contact and noncontact athletic activities, with injury occurring in the apprehension position of shoulder abduction and end-range ER. After traumatic dislocation, the clinician must perform a thorough upper extremity evaluation and manage the injury, ensuring neurovascular function; then, he or she must initiate an emergency action plan that involves activating emergency medical services and adequately immobilizing the limb for transport. If radiographic evidence rules out a fracture and confirms congruent reduction, the patient should be immobilized and referred to an orthopaedic surgeon for further evaluation.

Health care providers must counsel patients about treatment options after initial traumatic anterior glenohumeral dislocation and about the high recurrence rate, particularly in males 30 years of age and younger, if treatment is nonoperative.⁶ Whereas researchers have clearly indicated that operative repair after initial dislocation produces better functional outcomes,^{1,2,7,8} 19% to 56% of patients continue to opt for nonoperative treatment,⁸ which may include any combination of “wait and see,” immobilization, and rehabilitation.

In their systematic review, Paterson et al⁶ described immobilization strategies after initial glenohumeral dislocations. The use of IR slings has long been the standard of care. In patients less than 30 years of age, the rate of recurrent dislocation did not differ for patients immobilized in IR from less than 1 week to more than 3 weeks. Immobilization in ER did appear to trend toward reducing recurrence rates versus IR; however, no difference was found. Age less than 30 years was a strong predictor for recurrent dislocations in all studies reviewed.

This review had several limitations.⁶ The groups compared in these studies were not completely homogeneous, so measures had to be taken to ensure adequate comparisons. Whereas the optimal period of immobilization was evaluated from data included in 5 level I studies and 1 level II study with a large sample ($n = 1467$), the data for position of immobilization were from 2 level II studies and 1 level I study with a smaller sample ($n = 289$) and, therefore, led to the authors being less confident in recommending 1 position over the other for reducing recurrence rates.

Continued research on this topic demonstrates the ongoing debate and need for high-quality studies in which investigators address which, if either, immobilization position is more effective at reducing the rate of recurrent anterior glenohumeral dislocations. Paterson et al⁶ presented therapeutic level II recommendations. Since this review and meta-analysis,⁶ Liavaag et al⁹ have published a therapeutic level I study that provided additional insight into the optimal immobilization position for reducing recurrence rates. At a minimum

follow-up of 2 years, no difference in the recurrence rate of dislocation or subluxation, level of physical activity, or health-related quality of life was found between patients immobilized for 3 weeks in IR (24.7%, 23 of 93) or ER (30.8%, 28 of 91). When groups were combined, 51 patients (27.1%) had recurrent dislocations within 2 years, and the time to recurrence was approximately 11 months. Specifically, patients aged 16 to 29 years demonstrated recurrence with immobilization in IR (35.1%, 20 of 57) and ER (43.6%, 25 of 57). The data agreed with those reported in previous studies, suggesting higher recurrence rates in a population less than 30 years old. Interestingly, the ER immobilization group was more compliant with the protocol than the IR group (67.7% versus 47.4%, respectively). Liavaag et al⁹ did not address optimal immobilization duration and did not stratify patients by age. In conjunction with the Paterson et al⁶ review, the level I results of Liavaag et al⁹ provide mounting evidence to clinicians suggesting that the immobilization position likely has a minimal effect on recurrence rate.

Another important consideration that may influence patient decisions is the economic cost of nonoperative and operative treatments. In a cost-effectiveness study,⁷ primary arthroscopic stabilization was less expensive and more effective for 15-year-old girls and boys and 25-year-old men after a first-time dislocation. For 25-year-old women and 35-year-old men and women, operative repair was more effective but also more costly than nonoperative treatment. However, primary operative stabilization was less costly and more effective in all groups after patients experienced a single recurrent dislocation. Based on these data and the high recurrence rate, all patients, and especially males younger than 30 years of age, should be counseled to strongly consider operative stabilization instead of nonoperative treatment after the initial dislocation.

Given the propensity for patients to choose nonoperative treatment and the high recurrence rate, clinicians must be knowledgeable and prepared to manage patients with recurrent dislocations. When nonoperative treatment is being considered, the patient must recognize that multiple dislocations increase the tendency for recurrent episodes of instability that ultimately require operative repair to ensure glenohumeral stability. McMahon et al¹⁰ conducted a cadaver study that indicated 2 dislocations were sufficient to increase the likelihood of recurrence based on the forces required to dislocate the joint. However, the type of capsulolabral lesion that occurs because of the dislocation may affect this rate.

The findings of Paterson et al⁶ are just the beginning of the increasing effort to find the ideal position and duration of immobilization for nonoperative treatment after a traumatic dislocation. More studies must be done with more consistent and extended follow-up, including detailed rehabilitation information, to determine which factors contribute to reducing recurrent dislocations. As more evidence is revealed regarding the best nonoperative treatments for traumatic glenohumeral dislocations, athletic trainers will be able to use this knowledge to treat their patients in a more complete and cohesive way for long-term benefit.

REFERENCES

1. Jakobsen BW, Johannsen HV, Suder P, Sjberg JO. Primary repair versus conservative treatment of first-time traumatic anterior dislocation of the shoulder: a randomized study with 10-year follow-up. *Arthroscopy*. 2007;23(2):118–123.
2. Larrain MV, Botto GJ, Montenegro HJ, Mauas DM. Arthroscopic repair of acute traumatic anterior shoulder dislocation in young athletes. *Arthroscopy*. 2001;17(4):373–377.
3. Itoi E, Sashi R, Minagawa H, Shimizu T, Wakabayashi I, Sato K. Position of immobilization after dislocation of the glenohumeral joint: a study with use of magnetic resonance imaging. *J Bone Joint Surg Am*. 2001;83(5):661–667.
4. Itoi E, Hatakeyama Y, Sato T, et al. Immobilization in external rotation after shoulder dislocation reduces the risk of recurrence: a randomized controlled trial. *J Bone Joint Surg Am*. 2007;89(10):2124–2131.
5. Scheibel M, Kuke A, Nikulka C, Magosch P, Ziesler O, Schroeder RJ. How long should acute anterior dislocations of the shoulder be immobilized in external rotation? *Am J Sports Med*. 2009;37(7):1309–1316.
6. Paterson WH, Throckmorton TW, Koester M, Azar FM, Kuhn JE. Position and duration of immobilization after primary anterior shoulder dislocation: a systemic review and meta-analysis of the literature. *J Bone Joint Surg Am*. 2010;92(18):2924–2933.
7. Crall TS, Bishop JA, Guttman D, Kocher M, Bozic K, Lubowitz JH. Cost-effectiveness analysis of primary arthroscopic stabilization versus nonoperative treatment for first-time anterior glenohumeral dislocations. *Arthroscopy*. 2012;28(12):1755–1765.
8. Smith GC, Chessier TJ, Packham IN, Crowther MA. First time traumatic anterior shoulder dislocation: a review of current management. *Injury*. 2013;44(4):406–408.
9. Liavaag S, Brox JI, Pripp AH, Enger M, Soldal LA, Swenningsen S. Immobilization in external rotation after primary shoulder dislocation did not reduce the risk of recurrence: a randomized controlled trial. *J Bone Joint Surg Am*. 2011;93(10):897–904.
10. McMahon PJ, Yang BY, Chow S, Lee TQ. Anterior shoulder dislocation increases the propensity for recurrence: a cadaveric study of the number of dislocations and type of capsulolabral lesion. *J Shoulder Elbow Surg*. 2013;22(8):1046–1052.

Address correspondence to Brent I. Smith, DHSc, ATC, Department of Kinesiology, The Pennsylvania State University, 146D Recreation Building, University Park, PA 16802. Address e-mail to bis10@psu.edu.