

## Original research article

## Comparison of Scapular Manipulation vs. External Rotation in the management of Acute Anterior Shoulder Dislocation

Dr. Sushil Kumar Singh<sup>1</sup>, Dr. Rakesh Kumar<sup>2</sup>

<sup>1</sup>Senior Resident, Department of Orthopaedics, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, India.

<sup>2</sup>Senior Resident, Department of Orthopaedics, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India.

Corresponding Author: Dr. Rakesh Kumar

### Abstract

**Aim:** To compare Scapular Manipulation with External Rotation Method of Reduction of Acute Anterior Shoulder Dislocation for Sedation Requirements and Success Rates.

**Material and Methods:** The study was conducted in the Department of Orthopaedics, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, India, from December 2016 to January 2017. All 120 patients with clinical and radiographic features of anterior shoulder dislocation (on standard anteroposterior and lateral views) were included and allocated either into the SMM group (60 Patients) or the ERM group (60 Patients) alternatively on the basis of presentation. The groups were compared for sedation requirements, pain scores, and success rates.

**Results:** Of the 120, 60 patients each in the SMM group and ERM group. Out of 120 patients 74.17% were male and 25.83% were female. Reductions using SMM had fewer requirements for sedation (20% versus 35%;  $p < .05$ ) and higher first-pass success rates (80% versus 65%;  $p < .05$ ) as compared with ERM for anterior shoulder dislocation reduction. The numeric rating score of pain during reduction procedures was less in SMM (mean, 1.82 [standard deviation, 1.9]) than in ERM group (mean, 4.87 [standard deviation, 1.8];  $p < 0.01$ ). **Conclusion:** The technique of choice to treat shoulder dislocations ultimately is chosen by the doctor/clinic itself. However, further analysis of various methods could help to improve the efficacy of treatment.

**Keywords:** shoulder reduction, scapular manipulation, external rotation

### Introduction

Acute anterior shoulder dislocation is a common injury, accounting for 95% of all shoulder dislocations.<sup>1</sup> Several maneuvers for the reduction of the humeral head have been described with varying rates of success. The ideal method would be quick, painless, effective, and have a minimal risk for complications. Very often, shoulder dislocations are anterior (90–98%) and occur due to trauma.<sup>2</sup> The primary anterior dislocation incidence is estimated to be around 12.3 per 100,000 people.<sup>3</sup> Many reduction methods have been described in the literature.<sup>1</sup> The methods include different reduction maneuvers. However, few studies have compared the efficacy, reliability, and safety of the various techniques.<sup>1-3</sup> More and more people now indulge in recreational and sports activity which may be the cause for increased incidence of glenohumeral dislocation. Majority of shoulders are dislocated anteriorly (90–98%) with trauma being the main cause.<sup>4</sup> Shoulder dislocations account for almost 50% of all joint dislocations presenting to emergency departments.<sup>5</sup> Very often, shoulder dislocations are anterior (90–98%) and occur as a result of trauma.<sup>6</sup> Ideal reduction methods should be quick, effective, and as painless as possible for patients; and they should not cause iatrogenic complication. Traditional techniques to reduce the dislocated glenohumeral joint can be painful to the patient and may also be associated with further injury.<sup>7</sup> The external rotation method

(ERM) is described as a simple, safe, well tolerated, and reliable technique.<sup>8</sup> In the scapular manipulation method (SMM), the scapula is moved so that the glenoid rotates down to meet the humeral head.<sup>9</sup> It is claimed to be simple, effective, relatively painless, without complication, often requiring no sedation or analgesia, and with a success rate >90%.<sup>10</sup> SMM has been described as an ideal method to use in the wilderness setting because of safety and tolerability by patients. The use of procedural sedation and anesthesia in reducing a shoulder dislocation is a common practice but it carries some inherent risks of respiratory depression and cardiovascular compromise. It requires monitoring and extra staff.<sup>11</sup> As a result, deciding which technique to use is seldom based on objective criteria. Which method is superior is also unclear. An “ideal” reduction method would be effective, rapid, and as painless as possible for patients and should not cause iatrogenic complications. The aim of this prospective study was to compare clinical outcomes of the two methods in the emergency department (ED) without anesthesia.

### **Material and methods**

The study was conducted in the Department of Orthopaedics, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, India, from December 2016 to January 2017, after taking the approval of the protocol review committee and institutional ethics committee.

### **Methodology**

The technique, risks, benefits, results and associated complications of the procedure were discussed with all patients. 120 patients with clinical and radiographic features of anterior shoulder dislocation (on standard anteroposterior and lateral views) were included and allocated either into the SMM group or the ERM group alternatively on the basis of presentation. Patients who had associated multiple injuries or dislocations with fractures other than greater tuberosity fracture of the humerus, and patients with duration of dislocation >24 hours were excluded from the study. Neurovascular status of the injured limb was documented before and after the reduction. Patients were included in the study regardless of presence or absence of neurologic deficits. Radiographs were obtained after the reduction to confirm reductions. A numeric rating scale (NRS) score was recorded for all attempts of reduction during and after the reduction. Patients selected for scapular manipulation were placed in the prone position. The injured arm was placed overhanging from the edge of the bed and held at the elbow by an assistant with 90° of forward flexion of the shoulder. The elbow was flexed to relax the biceps tendon. After making sure that the patient was relaxed, the scapula was manipulated to effect reduction. This was accomplished by stabilizing the superior aspect of the scapula with one hand while adducting the inferior tip of the scapula using the thumb. Patients selected for the ERM were placed supine. After making sure the patient was relaxed, the affected arm was adducted against the torso. The elbow was flexed to 90°. The upper arm was externally rotated slowly and gently, using the forearm as a lever by grasping the wrist with one hand and the elbow with the other hand. The rotation maneuver was halted if the patient described pain or upon the forearm reaching the coronal plane. The first reduction attempt was carried out for each group without sedation or analgesia. The procedure was stopped and the first reduction attempt without sedation was considered to have failed if reduction was unsuccessful, the patient declared pain and asked us to stop the procedure at any time during the procedure, the patient stopped cooperating, or if muscle spasm was detected. For the second attempt, 1–5mg of midazolam (0.02–0.1mg/kg) was given intravenously to achieve minimal to moderate sedation. No analgesics were given at any point before or during the first and second attempts of reduction. Failure at second attempt was recorded as failure of the method and the patient was prepared for reduction under sedation and analgesia using the traction-countertraction method. If

sedation using the traction-counter traction method or the third attempt failed, reduction was done under general anesthesia in the operating theatre.

### Results

Of the 120 patients presenting to the center with anterior shoulder dislocation during the study period, 120 met the inclusion criteria and were enrolled in the study. There were 60 patients each in the SMM group and ERM group. Both groups were similar in terms of age and sex distribution. Most of the participants were 20–30 years. Out of 120 patients 74.17% were male and 25.83% were female. Reductions using SMM had fewer requirements for sedation (20% versus 35%;  $p < .05$ ) and higher first-pass success rates (80% versus 65%;  $p < .05$ ) as compared with ERM for anterior shoulder dislocation reduction. The numeric rating score of pain during reduction procedures was less in SMM (mean, 1.82 [standard deviation, 1.9]) than in ERM group (mean, 4.87 [standard deviation, 1.8];  $p < .01$ ). We found that the SMM requires less sedation and resulted in lower pain scores as compared with the external rotation technique for reduction of anterior shoulder dislocation. We found no difference in overall success rates of reduction between the two groups. However, the SMM group was more likely to achieve a successful reduction in the first attempt than the ERM group.

**Table 1: Demographic profile of Patients and Shoulder Dislocation Reduction Methods**

Characteristic	Scapular Manipulation	External Rotation	Overall	P Value
Age, mean (range), years	35 (17–68)	35 (18–72)	33 (17–72)	
<b>Sex, no.</b>				
Male	48	41	89 (74.17%)	
Female	12	19	31(25.83%)	
<b>Greater tuberosity fracture, no.</b>				
Absent	53	47	100	
Present	7	13	20	
<b>Neurologic deficit</b>				
Absent	60	60	120	
Present	0	0	0	
<b>Sedation</b>				
Required	11	22	33	.05
Not required	49	38	87	
Mean pain score during reduction	1.82	4.87	3.35	<.01
<b>Success of reduction, no. (%)</b>				
Successful at first attempt (without sedation)	48 (80)	39(65)	87(72.5)	
Unsuccessful at first attempt (without sedation)	12 (20)	21 (35)	33 (27.5)	.05
Overall reduction success rates	56(93.33)	56 (93.33)	112 (93.33)	

### Discussion

The Scapular Manipulation technique may also be considered for more frequent use, having the least pain, one of the shortest mean reduction times, and an above-average success rate. It is also said to be one of the easiest to perform methods, being suitable for new physicians. Currently, no single shoulder reduction method has a 100 % success rate, and no technique has been found to be ideal in every shoulder dislocation situation. An ideal method should be

simple, rapid, effective, painless, and free of complications and should facilitate rapid patient disposition. We found that the SMM requires less sedation and resulted in lower pain scores as compared with the external rotation technique for reduction of anterior shoulder dislocation. We found no difference in overall success rates of reduction between the two groups. However, the SMM group was more likely to achieve a successful reduction in the first attempt than the ERM group. In our study reductions using SMM had fewer requirements for sedation (20% versus 35%;  $p < .05$ ) and higher first-pass success rates (80% versus 65%;  $p < .05$ ) as compared with ERM for anterior shoulder dislocation reduction. The numeric rating score of pain during reduction procedures was less in SMM (mean, 1.82 [standard deviation, 1.9]) than in ERM group (mean, 4.87 [standard deviation, 1.8];  $p < .01$ ). Previous studies that studied the SMM individually or compared it with another method also found a low requirement of sedation.<sup>9,10,12-14</sup> NRS scores were lower with the SMM in our study. Findings from other studies have shown low pain scores during reduction by SMM when studied individually or in comparison with another method.<sup>12,15-17</sup> However, other studies done comparing the SMM with other reduction techniques have shown slightly higher success rates of the SMM compared with the findings in our study.<sup>9,12,18-24</sup> The common methods used for reduction of shoulder dislocations in the ED include the Kocher, Spaso, external rotation, Milch, Chair, Stimson, and the scapular manipulation methods.<sup>15,16,25</sup> The nontraditional techniques include the Boss-Holzach-Matter and the FARES (Fast, Reliable, Safe) methods.<sup>16,26</sup> Manipulation without sedation or anesthetics allows rapid recovery, thus reducing time the patient spends in the ED and freeing medical and nursing staff for other tasks.<sup>27,28</sup> Methods that do not require sedation are especially useful in the pre hospital and wilderness environments, where a successful reduction can improve the likelihood of safe evacuation, allowing the patient to assist in evacuation. It simplifies rescue by avoiding use of complicated devices and limits the need for other rescue personnel to be endangered.<sup>29</sup> on long trips where medications are often in a limited supply, less need for analgesics and sedatives is likely to be beneficial. This might also be important in high-altitude scenarios where most sedatives are best avoided for fear of respiratory depression in an already-hypoxic environment and because of lack of proper evidence regarding safety of these.<sup>30</sup> The ERM can be performed with the patient supine, sitting, or 45° recumbent.<sup>8,18</sup> The SMM is usually performed with the patient prone, although it can also be performed in the supine or seated positions.<sup>31</sup> Positioning, airway issues due to prone positioning, and difficulty performing the technique on obese patients are some of SMM's challenges.<sup>32</sup>

### Conclusion

The technique of choice to treat shoulder dislocations ultimately is chosen by the doctor/clinic itself. However, further analysis of various methods could help to improve the efficacy of treatment. We demonstrated greater success for reduction of anterior shoulder dislocation with the SMM when compared with the ERM as the initial attempt technique in non sedated ED patients with anterior shoulder dislocation.

### Reference

1. Cutts S, Prempeh M, Drew S. Anterior Shoulder Dislocation. *Ann R Coll Surg Engl*. 2009;91(1):2-7.
2. Hill JA. Epidemiologic perspective on shoulder injuries. *Clin Sports Med*. 1993;2:241-7.
3. Kroner K, Lind T, Jensen J. The epidemiology of shoulder dislocations. *Arch Orthop Trauma Surg*. 1989;108:288-90.
4. Westin C D, Gill E A, Noyes M E, and Hubbard M, "Anterior shoulder dislocation: a simple and rapid method for reduction," *American Journal of Sports Medicine*. 1995;23(3):369-371.

5. Blake R, Hoffman J (1999) Emergency department evaluation and treatment of the shoulder and humerus. *Emerg Med Clin North Am* 17:859–876
6. Westin CD, Gill EA, Noyes ME (1995) Anterior shoulder dislocation: a simple and rapid method for reduction. *Am J Sports Med* 23:369–372
7. Janecki CJ, Shahcheragh GH (1982) The forward elevation maneuver for reduction of anterior dislocations of the shoulder. *Clin Orthop* 164:177–180
8. Mirick MJ, Clinton JE, Ruiz E. External rotation method of shoulder dislocation reduction. *JACEP*. 1979;8(12):528–531.
9. Baykal B, Sener S, Turkan H. Scapular manipulation technique for reduction of traumatic anterior shoulder dislocations: experiences of an academic emergency department. *Emerg Med J*. 2005; 22(5):336–338.
10. Pishbin E, Bolvardi E, Ahmadi K. Scapular manipulation for reduction of anterior shoulder dislocation without analgesia: results of a prospective study. *Emerg Med Australa*. 2011;23(1): 54–58.
11. Godwin SA, Burton JH, Gerardo CJ, et al. Clinical policy: procedural sedation and analgesia in the emergency department. *Ann Emerg Med*. 2014;63(2):247–258.e218
12. Ghane MR, Hoseini SH, Javadzadeh HR, et al. Comparison between traction-countertraction and modified scapular manipulation for reduction of shoulder dislocation. *Chin J Traumatol*. 2014;17(2):93–98.
13. Goh SH, Low BY. The scapular manipulation method for reducing anterior shoulder dislocations. *Ann Acad Med Singapore*. 1996;25(1):134–138.
14. McNamara RM. Reduction of anterior shoulder dislocations by scapular manipulation. *Ann Emerg Med*. 1993;22(7):1140–1144.
15. Cunningham NJ. Techniques for reduction of anteroinferior shoulder dislocation. *Emerg Med Australa*. 2005;17(5–6):463–471.
16. Alkaduhimi H, van der Linde JA, Willigenburg NW, et al. A systematic comparison of the closed shoulder reduction techniques. *Arch Orthop Trauma Surg*. 2017;137(5):589–599.
17. Marinelli M, de Palma L. The external rotation method for reduction of acute anterior shoulder dislocations. *J Orthop Traumatol*. 2009;10(1):17–20.
18. Danzl DF, Vicario SJ, Gleis GL, et al. Closed reduction of anterior subcoracoid shoulder dislocation. Evaluation of an external rotation method. *Orthop Rev*. 1986;15(5):311–315.
19. Kothari RU, Dronen SC. Prospective evaluation of the scapular manipulation technique in reducing anterior shoulder dislocations. *Ann Emerg Med*. 1992;21(11):1349–1352.
20. Goh SH, Low BY. The scapular manipulation method for reducing anterior shoulder dislocations. *Ann Acad Med Singapore*. 1996;25(1):134–138.
21. McNamara RM. Reduction of anterior shoulder dislocations by scapular manipulation. *Ann Emerg Med*. 1993;22(7):1140–1144.
22. Marinelli M, de Palma L. The external rotation method for reduction of acute anterior shoulder dislocations. *J Orthop Traumatol*. 2009;10(1):17–20.
23. Anderson D, Zvirbulis R, Ciullo J. Scapular manipulation for reduction of anterior shoulder dislocations. *Clin Orthop Relat Res*. 1982(164):181–183.
24. Eachempati KK, Dua A, Malhotra R, et al. The external rotation method for reduction of acute anterior dislocations and fracture-dislocations of the shoulder. *J Bone Joint Surg Am*. 2004; 86-A(11):2431–2434.
25. Baden DN, Roetman MH, Boeije T, et al. Biomechanical reposition techniques in anterior shoulder dislocation: a randomised multicentre clinical trial- the BRASD-trial protocol. *BMJ Open*. 2017;7(7):e013676.
26. Maity A, Roy DS, Mondal BC. A prospective randomised clinical trial comparing FARES method with the Eachempati external rotation method for reduction of acute anterior dislocation of shoulder. *Injury*. 2012;43(7):1066–1070.

27. Janitzky AA, Akyol C, Kesapli M, et al. Anterior shoulder dislocations in busy emergency departments: the external rotation without sedation and analgesia (ERWOSA) method may be the first choice for reduction. *Medicine (Baltimore)*. 2015;94(47):e1852.
28. Johnson G, Hulse W, McGowan A. The Milch technique for reduction of anterior shoulder dislocations in an accident and emergency department. *Arch Emerg Med*. 1992;9(1):40–43.
29. Ditty J, Chisholm D, Davis SM, et al. Safety and efficacy of attempts to reduce shoulder dislocations by non-medical personnel in the wilderness setting. *Wilderness Environ Med*. 2010;21(4):357– 361.e352
30. Luks AM. Which medications are safe and effective for improving sleep at high altitude? *High Alt Med Biol*. 2008;9(3):195-98.
31. Doyle WL, Ragar T. Use of the scapular manipulation method to reduce an anterior shoulder dislocation in the supine position. *Ann Emerg Med*. 1996;27(1):92-94.
32. Mattick A, Wyatt JP. From Hippocrates to the Eskimo—a history of techniques used to reduce anterior dislocation of the shoulder. *J R Coll Surg Edinb*. 2000;45(5):312-16.

Received :13-08-2020 Revised: 17-08-2020. Accepted:25-09-2020