

**Management of Acute Anterior Shoulder Dislocation: a comparative study**Chandan Kumar<sup>1</sup>, Md Anwar<sup>2\*</sup><sup>1</sup>Specialist Medical Officer, SDH, Bagaha, West Champaran, Bihar, India<sup>2</sup>Senior Resident, Madhubani Medical College and Hospital, Madhubani, Bihar, India

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**Abstract**

**Aims:** 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 Orthopaedic, Madhubani Medical College and Hospital, Madhubani, Bihar, India from July 2019 to January 2020. All 100 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 (50 patients) or the ERM group (50 patients) alternatively on the basis of presentation. The groups were compared for sedation requirements, pain scores, and success rates. **Results:** There were 50 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 100 patients 75% were male and 25% were female. Reductions using SMM had fewer requirements for sedation (16% versus 34%;  $p < .05$ ) and higher first-pass success rates (84% versus 66%;  $p < .05$ ) as compared with ERM for anterior shoulder dislocation reduction. The numeric rating score of pain during reduction procedures was less in SMM (mean, 1.77 [standard deviation, 1.7]) than in ERM group (mean, 4.65 [standard deviation, 1.9];  $p < .01$ ). The SMM requires less sedation and resulted in lower pain scores as compared with the external rotation technique for reduction of anterior shoulder dislocation. There was 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. **Conclusion:** The 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.

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

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**Introduction**

Shoulder dislocations account for nearly 50 % of all major joint dislocations presenting to emergency departments [1]. Very often, shoulder dislocations are anterior (90–98 %) and occur due to trauma [2]. The primary anterior dislocation incidence is estimated to be around 12.3 per 100,000 people [3]. Many reduction methods have been described in the literature [1]. The methods include different reduction maneuvers. However, few studies have compared the efficacy, reliability, and safety of the various techniques [1–3].

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 [4]. Shoulder dislocations account for almost 50% of all joint dislocations presenting to emergency departments [5]. Very often, shoulder dislocations are anterior (90–98%) and occur as a result of trauma [6]. 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 [7]. The external rotation method (ERM) is described as a simple, safe, well tolerated, and reliable technique [8]. In the scapular manipulation method

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(SMM), the scapula is moved so that the glenoid rotates down to meet the humeral head[9], It is claimed to be simple, effective, relatively painless, without complication, often requiring no sedation or analgesia, and with a success rate >90%[10]. 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[11]. 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 orthopaedic, Madhubani Medical College and Hospital, Madhubani, Bihar, India from July 2019 to January 2020.

### Methodology

All patients with clinical and radiographic features of anterior shoulder dislocation (on standard antero-posterior 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-countertraction method or the third attempt failed, reduction was done under general anesthesia in the operating theater.

### Statistical analysis

SPSS, version 20 (IBM, www.ibm.com) was used for statistical analysis. Analysis of variance was used for analyzing the association of qualitative data with continuous variables. The  $\chi^2$  square test was used to analyze association between qualitative data.

### Results

Of the 120 patients presenting to the center with anterior shoulder dislocation during the study period, 100 met the inclusion criteria and were enrolled in the study. There were 50 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 100 patients 75% were male and 25% were female. Reductions using SMM had fewer requirements for sedation (16% versus 34%;  $p < .05$ ) and higher first-pass success rates (84% versus 66%;  $p < .05$ ) as compared with ERM for anterior shoulder dislocation reduction. The numeric rating score of pain during reduction procedures was less in SMM (mean, 1.77 [standard deviation, 1.7]) than in ERM group (mean, 4.65 [standard deviation, 1.9];  $p < .01$ ). 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
Age, mean (range), years	36 (16–70)	36 (19–89)	32 (16–89)
<b>Sex, no.</b>			
Male	41	34	75 (75%)
Female	9	16	25(25%)
<b>Greater tuberosity fracture, no.</b>			
Absent	45	40	85
Present	5	10	15
<b>Neurologic deficit</b>			
Absent	50	50	100
Present	0	0	0
<b>Sedation</b>			
Required	8	17	25
Not required	42	33	75
Mean pain score during reduction	1.77	4.65	3.24
<b>Success of reduction, no. (%)</b>			
Successful at first attempt (without sedation)	42 (84)	33(66)	75 (75)
Unsuccessful at first attempt (without sedation)	8 (16)	17 (34)	25 (25)
Overall reduction success rates	47(94)	47 (94)	47 (94)

Test applied: chi-square test

## Discussion

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 (16% versus 34%;  $p < 0.05$ ) and higher first-pass success rates (84% versus 66%;  $p < 0.05$ ) as compared with ERM for anterior shoulder dislocation reduction. The numeric rating score of pain during reduction procedures was less in SMM (mean, 1.77 [standard deviation, 1.7]) than in ERM group (mean, 4.65 [standard deviation, 1.9];  $p < 0.01$ ). Previous studies that studied the SMM individually or compared it with another method also found a low requirement of sedation. 9,10,12-14 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 [12,15-17]. 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 [9,12,18-24]. 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 [15,16,25]. The nontraditional techniques include the Boss-Holzach-Matter and the FARES (Fast, Reliable, Safe) methods [16,26]. 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 [27,28]. Methods that do not require sedation are especially useful in the prehospital 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 [29] 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[30]. The ERM can be performed with the patient supine, sitting, or 45° recumbent.[8,18]The SMM is usually performed with the patient prone, although it can also be performed in the supine or seated positions[31]. Positioning, airway issues due to prone positioning, and difficulty performing the technique on obese patients are some of SMM's challenge[32].

### Conclusion

We demonstrated greater success for reduction of anterior shoulder dislocation with the SMM when compared with the ERM as the initial attempt technique in nonsedated ED patients with anterior shoulder dislocation.

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