

Comparative Study of Reduction of Shoulder Dislocation with or without Hematoma Block

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ABSTRACT

Introduction: Shoulder dislocations are considered one of the most common joint dislocations. These dislocations are often associated with other injuries. Most of these reductions are done in the emergency department but some may require sedation or general anesthesia. The ideal method should be easy, simple, rapid, painless, effective, atraumatic, and should cause no additional injury to the shoulder joint, nerves, vessels, or musculoskeletal structures.

Methods: Fifty-four patients with anterior shoulder dislocation were divided into two groups and reduction was done with or without hematoma block. Patients between 18 and 75 and dislocations within 24 hours were enrolled in the study. Spaso method was used to reduce dislocation in all the patients. Demographic data, dislocation side, dominant side, cause of injury, number of dislocations, pre- and post-reduction neurovascular examination findings, reduction time, duration of stay in the emergency department, the presence of a tuberculum majus fracture, and any complications during the pre-and post-reduction period were recorded for all patients

Results: Age and gender distributions of patients were similar between both the methods. The majority of the patients were right-handed, and dislocation was in the dominant arm in 74.07 % of patients. The side, number of dislocations, cause of dislocation, presence of tuberculum majus fracture, pre-reduction neurological status, and the success of reduction were similar among both the groups. VAS score was better among the group with the hematoma block though not significant.

Conclusion: We suggest that the hematoma block is an effective method to reduce the pain in the treatment of anterior shoulder dislocations as they facilitate pain reduction, muscle relaxation, co-operation from the patient, thus, increasing the success rate and comfort of the patient.

Keywords: Hematoma; Shoulder Dislocation; Shoulder Joint

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INTRODUCTION

Shoulder dislocations is considered as one of the most common joint dislocations presenting in the emergency department accounting for almost 50% of major joint dislocations.¹⁻³ The shoulder dislocations can be anterior type (95-97%), posterior type (2-4%) and rarely inferior type (luxatio erecta) (0.5%).⁴ In anterior type, the humeral head is displaced out of the glenohumeral joint in front of the scapular glenoid, resulting in dissociation of the arm from the shoulder. Anterior dislocations are secondary to trauma on the externally rotated, abducted and extended arm.^{5,6} Posterior dislocations are less common and are caused by trauma on the anterior part of the shoulder with an axial force on an adducted and internally rotated arm and sometime because of intense muscle contractions due to an electrocution or seizure.⁷⁻¹⁰

These dislocations are often associated with other injuries.^{11,12} Over 20 different methods and their modifications have been described in the literatures for closed reduction, which consists of manipulation, traction, leverage or a combination of these.¹³⁻¹⁵ Closed reduction is an art and is very important to reduce the dislocation at the same time prevent complications.¹⁶ Most of these reductions are done in the emergency department but some may require sedation or general anesthesia. The ideal method should be easy, simple, rapid, painless, effective, atraumatic, and should cause no additional injury to the shoulder joint, nerves, vessels or musculoskeletal structures.^{17,18}

Reduction of the shoulder is the best form of analgesia and, is necessary to restore arm function. In many hospitals in the developed countries shoulder dislocations are still reduced under sedation or general anesthesia. Sedation or general anesthesia are usually recommended in the developing countries if close manipulation is unsuccessful.¹⁹⁻²¹ These sedatives or general anesthesia have serious side effects (cardiac and respiratory

depression, permanent brain damage, and even death), and require long stays in the hospital.²² Reduction without sedatives or anesthesia allows rapid patient recovery, reducing the time hospital time and cost.²³ Thus, unnecessary sedation should be avoided to reduce the potential complications wherever possible.

The risks of closed reduction of shoulder dislocation are minimal but may include rotator cuff injuries, fractures of the glenoid, coracoid process or humerus. Axillary artery or nerve injury is common in elderly patients during reduction, especially if the techniques require a significant amount of traction countertraction.^{5,24} Other less common nerve injuries include damage to the ulnar, radial, musculocutaneous nerves or brachial plexus.^{12,25}

To avoid these complications that may occur due to excessive and prolonged traction and countertraction, to minimize the pain and to increase the success rate of reduction, intra-articular injection with a lidocaine as a hematoma block can be used. Intraarticular lidocaine injection is inexpensive, technically a simple procedure known to all orthopedic surgeons and results in a rapid recovery time. The success of the hematoma block can be improved if the procedure is done under ultrasound guidance, which allows real-time visualization of the needle tip reaching the intraarticular area.¹⁹ Few studies have compared the efficacy, reliability, and safety of the intra-articular hematoma block for reduction of shoulder dislocation. Thus, the aim of this study was to provide a comparison of the success rates, their complication, risk and the pain provoked by these reduction methods.

METHODS

All patients diagnosed with anterior shoulder dislocation in the Emergency Department of Manipal Teaching Hospital, between July 1, 2019 - December 31, 2020, were enrolled in our study. There were 54 patients (32 males

and 22 females) in our study with a mean age of 37.4 years (20 to 68 years). The diagnosis of anterior shoulder dislocation was made based on the history, clinical examination and radiography of the shoulder. Conventional anteroposterior and trans-scapular view plain radiographs were taken pre- and post-reduction. The most common presenting symptoms included pain (n=50, 92.6%), deformity (n=38; 70.37%), and inability to move the shoulder (n=24; 44.44%). All patients between 18 years and 75 years with traumatic anterior shoulder dislocation were included in our study to meet the guidelines of the human subject committees. Our exclusion criteria included patients who did not consent to the study, history of allergic reaction to lidocaine, associated fracture of the neck, clavicle, glenoid or head of humerus or patients who presented after 24 hours of dislocation. Informed consent for the study was obtained from each patient. Reduction under sedation or general anesthesia was indicated to all patients who had failure of reduction or who refused closed manipulation and thus were excluded from the study. Patients were randomized using a table of random numbers to either closed reduction with or without hematoma block using opaque sealed envelope system with 27 patients in each group.

Injection technique: For the group with hematoma block, a lateral injection approach is used. The shoulder is first cleaned with antiseptics and under sterile conditions, 20 mL of 1 percent of lidocaine is injected using a 20-gauge needle into the shoulder joint, 1 cm inferior to the acromion process. The needle is directed medially and inferiorly, and advanced to a depth of 2-3 cm. The reduction of the dislocation is performed after a period of 15-20 minutes.

Reduction technique: For both the group we used Spaso method to reduce the dislocation. With the patient in supine position the affected

arm is grasped on the wrist or distal forearm and gentle and continuous traction is applied vertically. While maintaining the vertical traction, the shoulder is now slightly rotated externally. A clunk is felt and/or heard if the dislocation is reduced, usually within 5-10 minutes of gentle traction. If reduction is not achieved than the hand of the surgeon near the chest of the patient is used to palpate the head of the humerus in the axilla and gently push it to assist the reduction.^{24,26,27} The success of the reduction is confirmed by the return of the normal contour of the shoulder and the ability of the patient to place the affected hand on the opposite shoulder. (Figure. 1) After successful reduction of the dislocation, the shoulder is immobilized in shoulder immobilizer in the position of adduction and internal rotation and is discharged from the hospital with oral analgesics.



Figure1: Spaso method for reduction of shoulder dislocation

Rehabilitation: An intensive rehabilitation program is essential to decrease the rate of redislocation and frozen shoulder. Upto 3 weeks of immobilization, the patient is advised to wear the immobilizer at all times unless bathing. The patients are encouraged to mobilize the fingers, wrist and elbow. Pendulum exercises and gentle range of motion are started after 3 weeks but abduction and external rotation are still not permitted because these motions stress the anterior capsule.

At 5 weeks, isometric strengthening exercises and active-assisted range of motion exercises

are added to the program. Limited sports activities is permitted at 3 months, followed by full return to sports activities as tolerated by 4th month.²⁸

Follow-up: After reduction of anterior shoulder dislocation the patients were followed up at 3 weeks, 6 weeks and 12 weeks. Demographic data, dislocation side, dominant side, cause of injury, number of dislocations, pre- and post-reduction neurovascular examination findings, reduction time, duration of stay in the emergency department, the presence of a tuberculum majus fracture and any complications during pre- and post-reduction period were recorded for all patients.

The visual analog scale (VAS) scoring system was used to assess the degree of pain, during and after the reduction which was scored from 0 (no pain) to 10 (extremely severe). All the patients were asked to mark their level of pain and answer on the VAS scoring system.

Statistical analysis: In order for the study design to achieve at least 95% power with the use of an unpaired t test with a large effect size of 0.8 and an alpha (α) of 0.05, it was determined that at least 25 samples were required in each group. With a total of 27 samples in each group in our study, these numbers were sufficient for the analysis.

Study data were summarized using descriptive statistics (mean, standard deviation, frequency, percentage). Statistical analysis was performed with use of the SAS statistical package (SAS Institute, Cary, North Carolina) and included paired and unpaired t testing and multiple analysis of variance.

RESULTS

There were 54 patients (32 males and 22 females) in our study with a mean age of 37.4 (20 to 68 years). Out of them, 27 patients were treated by the closed method with hematoma block, whereas the other 27 patients were treated by the closed method without the hematoma block. Age and gender

distributions of patients were similar between both the methods. Majority of the patients were right-handed in both the groups, and dislocation was in the dominant arm in 74.07 % of patients with no significant difference between the two groups. The side, number of dislocations, cause of dislocation, presence of tuberculum majus fracture, and pre-reduction neurological status and the success of reduction were similar among both the groups. (Table 1)

There was no significant displacement of tuberculum majus fractures in any patients in the post-reduction radiographs, and union was achieved with conservative treatment. All the patients with pre-reduction neurological deficits improved after reduction and in the successive follow-up. Reduction time, and intra-reduction VAS were significantly better among the group with the hematoma block though not significant. (Table 2)

There were no complications or iatrogenic injuries, including new neurologic deficits, noted during or after the reduction attempts in any of the studied patients in both the groups.

DISCUSSION

At present, there is no single technique to reduce shoulder dislocation that has a 100 % success rate, and no technique is ideal in each and every shoulder dislocation. The overall success rates is 70-90% among various studies.²⁹ In our study, the success rate was slightly higher with hematoma block (96.29% and 88.88%) though statistically insignificant ($p=0.62$).

None of our patients received sedation or general anesthesia. Many previous studies reported that muscle contraction because of pain during traction, is the main cause of failure of reduction.^{26,30,31} Probably by decreasing the pain by the hematoma block we were able to improve our success rate even without sedations or anesthetics.

Though there are many reduction methods for shoulder dislocation, the surgeon should have knowledge of these techniques as choosing

the best technique often depends on many factors such as patient anxiety, comfort of the operator, availability of assistance and the sedation risks.³² In our study we used the Spaso method for reduction as it is very simple procedure with a high success rate (67.6– 87.5 %) and with minimal complication rates.³³⁻³⁵ In many comparative studies, no reduction

technique is found to be superior to the other in terms of reduction time.^{28,34,35} Similar to these studies, there was no statistically difference in reduction time between our groups, though it was slightly better with hematoma block. In our study, VAS pain score was lower for the procedure with hematoma block both during and after the reduction though

Table 1: Demographic distribution of patients for shoulder dislocation with and without lidocaine

		Reduction without hematoma block	Reduction with hematoma block	p-value
Age (years)	Male	39.6±10.2	42.3±8.4	0.25
	Female	35.7±11.5	34.6±9.2	
Side	Right	15 (56.55%)	16 (59.26%)	0.67
	Left	12 (44.44%)	11 (40.74%)	
Dislocation in dominant arm		21 (77.77%)	19 (70.37%)	0.69
Number of dislocation	First	17 (62.96%)	19 (70.37%)	0.73
	Recurrent	10 (37.03%)	8 (29.63%)	
Cause of dislocation	Sports	14 (51.85%)	12 (44.44%)	0.96
	Fall	8 (29.63%)	9 (33.33%)	
	Road traffic accident	5 (18.51%)	6 (22.22%)	
Tuberculus majus fracture		1 (3.7%)	2 (7.4%)	0.63
Pre-reduction neurologic deficit		3 (11.11%)	2 (7.4%)	0.78

Table 2: Outcome parameters of patients for shoulder dislocation with and without lidocaine

	Reduction without hematoma block	Reduction with hematoma block	p-value
Reduction time (minute)	6.2±1.2	4.3±1.4	0.26
First dislocation reduction time (minute)	6.3±1.5	4.6±0.8	0.08
Recurrent dislocation reduction time (minute)	5.6±1.0	4.4±1.1	0.06
Emergency department time (minute)	33.5±6.4	41.2±4.2	0.01
Intra-reduction VAS	7.2±1.6	6.1±1.5	0.23
Post-reduction VAS	4.7±1.2	4.2±1.3	0.295
Success rate of reduction	24 (88.88%)	26 (96.29%)	0.826

statistically not significant ($p=0.23$, $p=0.29$). The VAS score was comparable to many studies done for reduction of shoulder dislocation. In a study by Amar et al., they recorded VAS pain score as 5.4 and 5.3, respectively for Milch and Stimson reduction techniques.³⁶ Similarly, Sayegh et al. also reported comparable VAS scores of 1.6, 4.9, and 5.4 between FARES, Hippocratic, and Kocher techniques.³⁷

When we reduce a shoulder dislocation it is very important to overcome the pain and muscular resistance. If a procedure is done against pain and resistance, complications like fractures, nerve and vascular injuries are common.²¹ The incidence of such complications varies from 2-5% in various studies.^{5,17,25} But, in our study, we had no complications in any patient in either group. This can be attributed to long-term experience of the surgeon in reducing these dislocations. There were some limitations in our study. The main limitations are that, it had a low sample size to detect clinically important but small differences between reduction methods. The other limitation is that the follow-up period was short, so we could not evaluate any possible long-term soft tissue pathologies. However, we compared the clinically important parameters between the reduction techniques for shoulder dislocation.

CONCLUSION

There have been few prospective studies published in the orthopaedic and emergency medicine literature showing the benefits of intra-articular analgesia for successful shoulder reductions. This method is less commonly discussed as an alternative methods for patients with shoulder dislocations. On the basis of our study, we suggest that the hematoma block is an effective method to reduce the pain in the treatment of anterior shoulder dislocations. This facilitates pain reduction, muscle relaxation, co-operation from the patient, thus, increasing the success rate and comfort of the patient, at the same time

reducing the requirement and complications of sedation or general anesthesia.

CONFLICT OF INTEREST

None

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