



ISSN: 2091-2749 (Print)
2091-2757 (Online)

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External rotation method for reduction of acute anterior dislocation of shoulder

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ABSTRACT

Introductions: Many different techniques of reduction of acute anterior shoulder dislocation have been described. The aim of this study was to evaluate the effectiveness of external rotation method for reduction of acute anterior shoulder dislocation.

Methods: Fifty-one patients with acute anterior shoulder dislocations with or without greater tuberosity fracture were reduced during a period from January 2013 to January 2015. The external rotation method was used as an initial reduction method performed by orthopaedic surgeon on call or residents. Data sheets completed by the orthopaedic surgeon on call or residents were evaluated with regard to the type of dislocation, the effectiveness of the procedure in achieving reduction, the need for premedication, the ease of performing the reduction, and complications, if any.

Results: There were 42 male and nine female patients between 18 to 78 years. Among 51 patients, 49 had successful reduction. No premedication was required in 33 patients who had a successful reduction, and the average time required for reduction in 23 patients was within two minutes whereas 20 patients reduced within five minutes. Only four patients reported severe pain during the process of reduction. The method was not successful in two patients with subcoracoid dislocation associated with displaced fracture of the greater tuberosity.

Conclusions: External rotation method is reliable, safe, simple and relatively painless method for reduction of acute anterior shoulder dislocation.

Keywords: acute anterior shoulder dislocation, external rotation method, painless reduction

INTRODUCTIONS

Different techniques have been described for the reduction of anterior shoulder dislocation dating as far back as Hippocrates.¹ Traditional techniques of reduction can be painful to the patient and may be associated with iatrogenic complications.²⁻⁴ The newer techniques are essentially adaptations of earlier methods, which have evolved due to the development of modern imaging modalities that have enabled complications to be identified.⁵ The optimal technique should be quick, effective, and simple to perform and should require minimal force, analgesia and assistance, without iatrogenic complications. The external rotation method is reported to be safe, comfortable, and reliable method by the various authors.⁶⁻⁸ The aim of this study was to assess the efficacy of external rotation method in the reduction of various subtypes of acute anterior shoulder dislocation with or without a greater tuberosity fracture.

METHODS

A prospective study was conducted in the Emergency Department, Patan Hospital from January 2013 to January 2015.

Adult patients above 18 years with anterior shoulder dislocations with or without greater tuberosity fractures were included in this study. Exclusion criteria were patients with open growth plates, polytrauma patients, dislocations associated with Neer⁹ three-part and four-part, or head splitting proximal humeral fractures, dislocations associated with severe glenoid fractures (Ideberg type II to V)¹⁰ and patients presented after 48 hours of injury. Written informed consent was taken from patients.

Data collection included demographic data, mechanism of injury, side of limb, subtypes (subcoracoid, subglenoid or subclavicular), duration of injury and associated greater tuberosity fracture. A delay in presentation and previous attempts for reduction, if any, were recorded. Associated neurovascular

injury, premedication used and time needed to complete reduction were documented. The patient was asked to rate the amount of pain during the reduction as none, mild, moderate, or severe. Alternate methods (if any) that were used following unsuccessful attempts with the external rotation method and complications related to the reduction method were also recorded. The data sheets were completed by the orthopaedic residents or surgeon on call.

External Rotation Technique

The external rotation method reduction was demonstrated in classroom setting for orthopaedic residents and instructed to use initially in the treatment of acute anterior dislocations of the shoulder. The detail procedure use for reduction:

Patient was kept in the supine position and the orthopaedic surgeon or resident on duty stood on the side of the affected shoulder facing the patient. Premedication was used as and when needed. Traction was not applied. The elbow was flexed to 90°, and the arm was adducted to the side of the chest. The shoulder was placed in 20° of forward flexion. The treating orthopaedic resident held the patient's wrist with one hand and stabilized the elbow with the other. With the grasped wrist used as a guide, the shoulder was gently externally rotated until the forearm was in the coronal plane. The great care was taken to use minimal force to avoid excessive torque and its associated complications. Once the reduction was successful, the arm was gently internally rotated to bring the forearm to lie across the chest. The reduction was confirmed by clinical examination, and the neurovascular status of the arm was reassessed. The shoulder was placed in a shoulder immobilizer, and post-reduction radiographs were made to confirm the reduction. Premedication whenever used were intravenous sedation with diazepam or midazolam with pentazocine as per body weight, at the request of the patient.

RESULTS

Fifty-two patients with anterior shoulder dislocations were treated with external rotation method in the emergency department during the two year study period. One patient with history of recurrent dislocation was excluded from the study as the patient had spontaneous relocation. The remaining 51 patients were included in this study. There were 42 (82.4%) male and nine (17.6%) female. The mean age was 36.55 years (range, 18 to 78 years). Twenty-seven (52.9%) right shoulders and 24 (47.1%) left shoulders were involved. The mechanisms of injury were simple fall in 19 (37.3%), road traffic accidents 15 (29.4%), fall from the height 10 (19.6%) and sports injury in six (11.8%) patients. The dislocation was subcoracoid in 33 (64.7%) and subglenoid in 18 (35.3%). Five (9.8%) patients had associated greater tuberosity fractures, three subcoracoid and two subglenoid dislocation. Ten patients (19.6%) among 51 had previous history of dislocation.

External rotation method was successful in 49 out of 51 patients. This method was unsuccessful in two patients who were 46 and 34 years old. Both patients presented 24 hours after the dislocation and had subglenoid dislocation with displaced greater tuberosity fractures. They were reduced subsequently under general anaesthesia with traction and counter-traction method. Among 49 patients, reduction of the shoulder dislocation was achieved within two minutes in 23 (46.9%), within five minutes in 20 (40.8%), and six (12.2%) patients required more than five minutes (range 6-10 minutes). Single attempt was successful to reduce the dislocations in 35 (71.4%), nine (18.4%) required two attempts and five (10.2%) required three attempts. No premedication was used in 33 (67.3%) patients and 16 (32.7%) patients require intravenous premedication. Among 33 patients reduced without premedication, 15 patients had no pain, seven had mild pain, seven had moderate pain and four had severe pain. Similarly, 16 patients who were treated with premedication, nine patients had no pain whereas four patients had mild pain and three patients had moderate pain. The mean

duration of the hospital stay for 49 patients treated successfully with external rotation method was 2.5 hours (range, one to six hours). Two patients treated with traction and counter-traction method under general anaesthesia were admitted to the orthopaedic ward for overnight observation and discharged next day. No iatrogenic complications were noted in this study.

DISCUSSIONS

External rotation method was successful in reduction of 49 out of 51 patients with acute anterior shoulder dislocation without complications. Various studies⁶⁻⁸ have shown external rotation method as a safe and reliable method with minimal patient discomfort and can be performed by a single physician. Traditional methods of reduction are often technically difficult, time consuming, and painful to the patient. Furthermore, they frequently require more than one physician and occasionally exacerbate the injury. Most techniques of reduction of anterior shoulder dislocation involved either traction or leverage, although often combinations of the two are employed. Traction increases muscle spasm and may make reduction difficult, more painful, and less likely to succeed.^{8,11}

Leidelmeyer¹² originally described about the external rotation method. We followed the slight modification technique as described by Eachempati⁸ where the shoulder was kept in 20° forward flexion before commencing the external rotation. This positioning was used to facilitate relaxation of the anterior capsule of the shoulder and to prevent any bow-stringing action of the long head of the biceps and the conjoint tendon.

Mirick MJ and colleagues⁷ reported 80% success rate among their 85 patients with this method even in inexperienced hands without any iatrogenic complications attributable to this technique. Eachempati and colleagues⁸ reported successful reduction in 36 patients among 40 patients (90%). George Tseng and colleagues¹³ showed 78% success rate in their

92 cases of anterior shoulder dislocation treated with external rotation method as the initial technique and they recommended as the initial technique for anterior shoulder dislocations. Danzl DF and colleagues¹⁴ reported the successful reduction in 78 of 100 consecutive patients presented with anterior shoulder dislocations. Similarly, M. Marinelli and L. de Palma¹⁵ showed 29 out of 31 successful reductions using this technique. They recommended that this technique should be included in the physician's armamentarium for initial closed reduction of anterior shoulder dislocation. Our study demonstrated that the external rotation method is easy to perform and able to achieve a closed reduction of an acute anterior dislocation or fracture-dislocation of the shoulder in 96% of the patients. Our success rate is similar to that reported by Mirick,⁷ Eachempati,⁸ George Tseng,¹³ Danzl DF¹⁴ and colleagues.

Various methods of anesthesia are available for reduction, e.g. intravenous sedation, intra-articular lignocaine, general anaesthesia, etc. Although intra-articular lignocaine has been shown easy, safe as a method of anaesthesia for reduction by different literatures, there is no statistically significant difference in time for reduction manoeuvre, difficulty of reduction or subjective pain.¹⁷ Kosnik and co-workers¹⁶ reported failure with intra-articular lignocaine group if the patient presented after 5.5 hours of dislocation in their randomized non blinded clinical trial between local intra-articular lignocaine and intravenous anaesthesia and sedation. Mirick⁷ and Leidelmeyer¹² recommended use of intravenous sedation in patients who were seen with a dislocation for the first time. However, in our series, in 33 patients who had a dislocation for the first time (67.3%), reductions were performed without the use of sedation.

Two subglenoid dislocations with displaced greater tuberosity fractures could not be reduced successfully. They presented after 24 hours of dislocation; had severe muscle spasm and pain and were very apprehensive with poor compliance. Reduction was achieved with the use of traction-counter-traction method

under general anaesthesia. Ceroni D and co-workers¹⁸ has recommended reduction of subglenoid dislocation with a fracture of the greater tuberosity should be done under general anaesthesia initially to avoid iatrogenic fractures of the anatomical neck of the humerus. We agree with their recommendations as we faced difficulty in the similar subtypes of fracture dislocation of shoulder.

We had not encountered any iatrogenic complications with this technique. Some of the limitations of our study were few numbers of cases included, no comparison with other techniques of reduction; and patients were not entered consecutively so that the treating orthopaedic resident or surgeon on call had possibility to preselect patients in whom they thought would be successful.

CONCLUSIONS

External rotation method is reliable, safe, simple and relatively painless method that can be done easily by a single physician for reduction of anterior shoulder dislocation as shown by our study with 49 out of 51 successful reductions.

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