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Anterior shoulder dislocation

Seated versus traditional reduction technique

Background

Anterior dislocation of the shoulder joint is a common presentation to hospital emergency departments (EDs).

Aim

To compare the requirement for sedation and length of ED stay utilising the author's seated shoulder reduction technique (SRT) with traditional shoulder reduction (TSR) techniques in the ED.

Method

A retrospective chart review of patients presenting to the ED between January 2005 and December 2007 was conducted. The review assessed technique, mean length of stay, sedation requirements and incidence of complications in patients who were treated with either the author's SRT or with TSR.

Results

A total of 486 patient charts were reviewed and 404 met inclusion criteria. Patients were categorised into the SRT group: 66 (16.3%) and TSR group: 338 (83.7%). Mean age of the groups was 30 years (SRT) vs. 29 years (TSR), with 80% being male. Mean length of stay in the SRT group was 1.5 hours (95% CI: 1.1–1.9) vs. TSR 2.9 hours (95% CI: 2.3–2.9; $p<0.001$). Sedation was not required in patients in the SRT group, but was required for all patients in the TSR group. No complications were reported in either group.

Conclusion

In this study group, the author's technique was successful in reducing anterior shoulder dislocation, without the need for sedation, and reduced length of ED stay when compared to TSR techniques.

Keywords: orthopedics; sports medicine; shoulder joint, dislocations

Anterior dislocation of the shoulder (glenohumeral) joint is a common presentation to hospital emergency departments (ED) and accounts for 90–95% of all shoulder dislocations.[1] Patients commonly presenting to EDs with anterior shoulder dislocation are aged 18–30 years as the aetiology of injury is commonly related to sporting activity. There are many anterior shoulder reduction techniques (SRT), which can be categorised under four main headings of traction: counter traction, leverage, scapular manipulation, and combinations of these manoeuvres.[2] While there are traditionally described standard techniques that head each group, such as Hippocratic, Kocher, Milch and Spaso methods, most recently published techniques are either variations or combinations of these traditional methods.[1,3–8]

In order to evaluate the effectiveness of any technique it is important to review the procedure and its effects within the context of the environment in which it is undertaken. Variables of anterior SRT may include:

- rate of effective reduction
- adequacy of pain management
- requirement for sedation
- side effects of sedation and pain management
- complication rate
- need for further monitoring or assessment.

Context variables include:

- the number and expertise of personnel required to perform the reduction
- equipment required for the chosen reduction technique
- ED activity (both overcrowding and lack of access to a suitable space affect waiting time)
- length of stay in the ED (or other location).

A new seated method of anterior shoulder reduction has been developed and used (*Table 1*) by the author while working in the ED of the Prince of Wales Hospital (New South Wales). The method requires only one staff member, does not require a bed and significantly, does not require augmentation with analgesia or procedural sedation. To date, there has been no comparison of this technique with other previously described methods of shoulder reduction. This method of shoulder reduction has been approved as a technique in the Prince of Wales Hospital and is now being used by peers within the department.

Method

The Prince of Wales Hospital is an urban tertiary referral hospital with an adult ED (patients aged over 16 years) that sees over 45 000 patients per year. A retrospective study of patients presenting to the ED with anterior shoulder dislocation between January 2005 and December 2007 was conducted in order to compare a new seated method of reduction used by the author, with other more traditional methods. Techniques commonly used in the Prince of Wales Hospital ED for anterior shoulder reduction include versions of Kocher, Spaso and Hippocratic traction with countertraction. In this article these are referred to as 'traditional shoulder reductions' (TSR).

Permission to conduct this study was obtained from the Northern Hospital Network Human Research Ethics Committee of the South Eastern Illawarra Area Health Service.

The author's SRT has been used in the Prince of Wales Hospital ED since 2003. The 2 year period from January 2005 to December 2007 was chosen to allow access to a good sample size to conduct this retrospective study. Patient data was collected utilising the Emergency Department Information System (EDIS). Patients who had presented with shoulder dislocation between the specified dates were identified through EDIS by searching for the Diagnostic ICD code: 9 831.00 (shoulder

dislocation). Patient files were subsequently obtained from the hospital's medical records department. All patients were initially identified by patient name, gender, age and hospital number. For the purposes of this study, once the data was obtained, patients were then only identified by their hospital number. X-rays were requested directly from the radiology department based on the identification of selected patients through EDIS.

The preliminary search showed a large number of presentations with shoulder dislocations to the Prince of Wales Hospital ED during the specified period. Therefore, the search was further refined to identify specifically anterior shoulder dislocations that had required reduction, through an explicit review of patients' charts. Patient chart reviews also included an audit of triage documentation, emergency physician documentation and medication charts. Age and gender of the patient, triage time, doctor encounter time and time of departure from the ED were searched for through EDIS, while use of analgesia and/or sedation, complications of shoulder dislocation and relocation were searched for in the patients' notes. Inclusion and exclusion criteria were set and strictly adhered to. Details of these criteria are shown in *Table 2*. Importantly, patient charts used in the study were from patients aged 16 years or more who presented with radiologically confirmed anterior shoulder dislocation, had a GCS of 15 and were able to follow instructions. Patient charts not fulfilling these criteria or that showed complications associated with the dislocation (eg. suspected humeral fracture, multiple trauma, or requiring a bed in the emergency medical unit) were immediately excluded from the study.

Patients were divided into two groups: 'new SRT performed or supervised by the author' and 'all other TSR performed in the ED'.

Reduction using the author's SRT (performed by other operators), was confirmed in each case through the patient notes.

Outcome measures were:

- effectiveness of reduction
- type of sedation used (if any)
- length of stay
- presence of complications.

Statistical analysis was performed utilising Graph Pad InStat statistical software and the Mann-Whitney test for signicance. Statistical significance was present if $p<0.05$. Results are expressed as mean and range.

Table 1. The chair technique – seated technique for reduction of anterior shoulder dislocation

Step	Procedure
Step 1	• A full explanation of the procedure is given to the patient – opportunity is given for questions. • Reassurance of the quick nature of the procedure is given • The patient is encouraged to maintain the affected shoulder/arm in a position most comfortable to them – this position will not be altered but accommodated during the reduction technique
Step 2	• The patient is instructed to sit on a chair either with the back of the chair against their chest, or the affected side against the back of the chair – the chair should have a straight back, preferably the back of the chair will be height adjustable and without wheels and arms (*Figure 1*, *2*)
Step 3	• A towel is placed on the back of the chair • The patient is assisted with the placement the axilla of the affected side on the towel while gently drawing the affected arm over the back of the chair – this is achieved by the patient initially being in a standing position, using a 'dangling' motion of the arm over the back of the chair while moving into a sitting position. (The operator of the reduction technique does not alter the natural position of the arm or shoulder to attain this and the patient is not discouraged from supporting the affected arm until the operator begins the reduction technique)
Step 4	• Gentle continuous downward traction of the wrist or forearm is performed while reassuring the patient and talking to them – there is no external rotation of the arm or scapular manipulation in this technique. (The back of the chair is used as a support only and not as countertraction)

Figure 1. Seated reduction technique for shoulder reduction with patient sitting side on chair
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Figure 2. Seated reduction technique for shoulder reduction with patient facing doctor
Image reproduced with permission of the volunteer

Table 2. Inclusion and exclusion criteria set for the purposes of this study

Inclusion	Exclusion
Patients aged over 16 years	Lack of documentation on sedation in patient files
Confirmed anterior shoulder dislocation (clinical or X-ray)	Complications of shoulder dislocation (eg. fractured humerus)
Glasgow Coma Scale equals 15	Patients requiring occupational therapy
Isolated shoulder injury	Multiple injuries
Able to sit in a chair independently (although assistance may be given to initially gain position)	Patients requiring general anaesthetic for reduction
Able to understand English	Patients remaining in emergency medical unit

Table 3. Key results from analysis of retrospective study data

Variable	Seated reduction technique (author's technique)	Traditional shoulder reduction	*p* value
Patient number	66	338	
Male	53 (80.3%)	264 (78.1%)	NS
Female	13 (19.7%)	74 (21.9%)	NS
Mean age	30	29	NS
Mean length of stay (hours)	1.5	2.9	$p<0.001$

NS = not statistically significant

Results

During the study period, 486 patients presented to the ED with anterior shoulder dislocation requiring reduction. Eighty-two patients were excluded from the study due to lack of documentation on whether analgesia and/or sedation had been used in the TSR (n=80), and to patients having stayed in the emergency medical unit (n=2).

Of the remaining 404 presentations analysed, 66 were treated using the SRT. (The author reduced 39 and supervised the reduction of a further 27 anterior shoulder dislocations.) Of these patients, 53 were male (80.3%) and 13 were female (19.7%). The TSR group comprised 338 patients, of which 264 were male (78.1%) and 74 (21.9%) were female. The mean age of the SRT group was 30 years and 29 years in the TSR group. There was no statistically significant difference in age or gender between the two groups (*Table 3*).

Efficacy and complications

There was a 100% success rate of reduction across both groups. Emergency physicians confirmed there were no physical complications such as Bankart lesion or Hills-Sachs deformity on postreduction X-rays and no evidence of axillary nerve damage on clinical examination in either group of patients. This was confirmed in the patients' charts.

Sedation

None of the patients in the SRT group were given sedation, whereas all of the patients in the TSR group received sedation.

Length of stay

The mean length of ED stay was significantly shorter in the SRT group when compared to the TSR group. Of the 404 patients with shoulder dislocation, those who were reduced using the seated shoulder reduction technique had a significantly shorter length of stay than the TSR group, the mean length of stay being 1.5 hours versus 2.9 hours (*Table 3*).

Table 4 shows details of sedation used in the TSR group including types and combinations of sedating agents and numbers per group. While all patients in the TSR group were given some form of sedation, 23.4% were given the combination of Fentanyl and Midazolam. All of the sedation and/or analgesia combinations mentioned in the table provide a significant degree of sedation.

Discussion

Shoulder dislocation is usually the result of traumatic injury (especially sports related). The management by reduction of anterior shoulder dislocation remains variable and is dependent on the skills and selection of technique of the operator. With many reduction techniques there is a need to provide procedural sedation in order to facilitate the necessary muscle relaxation for reduction to be effected. This may complicate what can be a simple procedure. Patients usually require a longer period of observation in the ED to recover from sedation and may experience complications resulting from the procedural sedation technique. Taylor et al[9] reported an incidence of airway events of 17.6% in 2623 patients undergoing procedural sedation. While the SRT can be added as an alternative method for reduction without sedation, further prospective study, including patient surveys, needs to be conducted to fully assess the impact on outcomes, pain scoring and management.

While all commonly used shoulder reduction techniques utilised in this study showed no difference in the rate of physical complications when compared with the SRT, prospective studies need to be conducted to compare the commonly used techniques with the author's simple one movement technique. Traditional reduction methods often involve strong force (traction, countertraction, leverage), which can be painful and potentially traumatic.[3]

The use of radiography in the management of anterior shoulder dislocation has been widely discussed, including the question of the benefit of postreduction X-rays.[10] Hendy[11] suggests that emergency physicians are highly accurate in clinical determination of shoulder dislocation and reduction, however, X-rays should be used in the event of uncertainty; X-rays should also be performed in the event of traumatic injury. A comprehensive physical examination including a thorough neurovascular assessment of the upper limb, as well as detailed history taking is imperative to rule out neurological deficit and/or suspected fracture.[12] This may negate the necessity for prereduction X-rays and therefore reduce not only exposure to radiation, cost and manpower, but also length of ED stay. As Park[13] states, 'early detection before the onset of muscle spasm is essential'.[13] Emond et al[14] further confirm the use of history taking as an important tool in confirming shoulder dislocation, suggesting that age (below and above 40 years) and mechanism of injury, play an important role in the choice of technique and ensuing success rate.

Table 4. Types of sedation and analgesia used

TSR patients (n=338)	
Sedation used	**Number of patients**
Fentanyl + midazolam	79
Morphine + midazolam	69
Nitrous oxide	57
Propofol alone	44
Morphine alone	26
Propofol + midazolam	14
Propofol + fentanyl	7
Morphine + fentanyl + midazolam	6
Midazolam alone	6
Ketamine + midazolam	6
Propofol + morphine	6
Fentanyl alone	5
Propofol+ morphine + midazolam	5
Morphine + nitrous oxide	2
Propofol + fentanyl + midazolam	1
Propofol + ketamine	1
Propofol + fentanyl + morphine	1
Morphine + diazepam	1
Fentanyl + nitrous oxide	1
Methoxyflurane	1
Total of TSR in which sedation used	338 patients
Seated reduction technique (n=66)	
No sedation	66 patients

The initial retrospective study by Emond et al, as well as Hendy's telephone follow up review add evidence to the necessity of postreduction X-rays.[11,14] In both cases no fractures or other complications were missed. In the author's retrospective study all patients had postreduction X-rays reviewed by a senior clinician to confirm the lack of complications.

The use of sedatives, with or without analgesia in shoulder reductions has been thoroughly investigated.[15] Studies have been conducted to look at the efficacy of combination of sedatives and analgesia as well as the effects of types of sedatives used. Complications associated with intravenous medication for procedural sedation are also well documented, as discussed below.

Studies have shown that physician choice of procedural sedation agent is consistent with that described in the TSR group of this study with the midazolam and opiate combination being the most popular choice of sedation and pain relief.[16]

Some studies have suggested propofol as an alternative to a midazolam and opiate combination because of the known advantage of shorter sedation times. However, this needs to be weighed against the possibility of adverse events, particularly respiratory depression and vomiting (aspiration).[9] Despite the shorter wakening times, Dunn[17] reported that there was no great improvement in overall length of stay with propofol. Due to potential side effects, patients may have to wait for their reduction to occur while personnel and resources are assembled. Importantly this will add to patient distress, increase the risk of muscle spasm and prolong length of stay. Patients will also require a monitored bed (for oxygen saturation and cardiac monitoring) and administration of supplemental oxygen.

Procedural sedation can result in the need for airway management. In a study conducted by Descamps,[16] it was highlighted that during sedation, at the very least, jaw thrust and in some cases ventilation support was required.[16]

Planning of a prospective study of the SRT is already underway in the Prince of Wales ED. This study will look in detail at the technique's ease of reproducibility within the junior medical and nursing team, length of stay by looking at exact patient contact and departure times, history of prior dislocations as well as prehospital sedation. This study commenced early in 2010 and if the benefits of SRT are confirmed, this technique may be a useful tool in reducing service times within the ED.

Study limitations

- Retrospective study design
- Nonblinded chart review
- Author may be biased by the use of own technique and by not being blinded to data collection
- No data was collected on patient or staff satisfaction with techniques
- No patient follow up.

A 2 year period of data analysis was required to enable a reasonable number of cases to be evaluated. The limitation and potential selection bias relates only to the constraints of the dates the procedure has been used at the Prince of Wales ED (ie. 2003 to present). It is also important to note that neither prior dislocation history nor pain score were documented satisfactorily in the patient's notes. It would be beneficial to organise a follow up survey of patient satisfaction as part of the prospective study to evaluate this. While all patients in the SRT group had successful reduction on the first attempt of the technique, conducted either by the author or other doctors, there is no indication in the patient notes in the TSR group if there was more than one attempt. These items will be addressed in the forthcoming prospective study. There is a difference in sample size between the two groups during that period, however, this was not determined until after the random search was conducted on EDIS. The dates of the analysis period were not changed at any point in the study.

Conclusion

The SRT was as successful as other methods in reducing shoulder dislocations. This study has shown encouraging results including significant reduction in length of stay, and no unnecessary use of sedation. The SRT is technically easy and only a chair and a single operator are required, which reduces the use of valuable ED resources. To date, despite many studies having been conducted on techniques and interventions in the management of anterior shoulder dislocation, there remains limited direction in terms of procedural protocols.

The planned prospective study will further analyse these results, particularly addressing any limitations within this study and looking forward to recommendations for protocols within the ED.

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References

1. Matsumoto K, Itoh Y, Fukuta M, et al. Anterior dislocation of the shoulder: a simple and sitting method for reduction. Current Orthopaedic Practice 2009;20:281–4.
2. Kuah DEK. An alternative slump reduction technique of anterior shoulder dislocations: a 3-year prospec-

tive study. Clin J Sport Med 2000;10:158–61.
3. McNamara RM. Reduction of anterior shoulder dislocations by scapular manipulation. Ann Emerg Med 1993;22:1140–4.
4. McKinley M. Anterior shoulder reductions revisited. The Journal of the Canadian Association of Emergency Physicians 2009;11:385–6.
5. Dyck DD, Porter NW, Dunbar DB. Legg reduction manoeuvre for patients with anterior shoulder dislocation. J Am Osteopath Assoc 2008;108:571–3.
6. Oza MN. Direct humeral head manipulation (Oza Maneuver) for anterior shoulder dislocations. Ann Emerg Med 2004;44:282.
7. Ashton HR. Kocher's or Milch's technique for reduction of anterior shoulder dislocations. Emerg Med J 2006;23:570–1.
8. Cunningham NJ. Techniques for reduction of anteroinferior shoulder dislocation. Emergency Medicine Australas 2005;17:463–71.
9. Taylor DM, O'Brien D, Ritchie P, et al. Propofol versus midazolam/fentanyl for reduction of anterior shoulder dislocation. Acad Emerg Med 2005;12:13–9.
10. Tannenbaum RD, Kondabala RK, Stockmal PJ. Postreduction radiographs for anterior shoulder dislocation: a reappraisal. Ann Emerg Med 2001;37:418–9.
11. Hendy GW. Necessity of radiographs in the emergency department management of shoulder dislocations. Ann Emerg Med 2000;36:108–13.
12. Amin AK, Robinson CM. Fractures and dislocations of the shoulder girdle. Surgery 2006;24:415–20.
13. Park MC. Shoulder dislocation in young athletes: current concepts in management. Physician and Sports Medicine 2002;30:41–8.
14. Emond M, Le Sage N, Lavoie A, et al. Refinement of the Quebec decision rule for radiography in shoulder dislocation. CJEM 2009;11:36–43.
15. Fitch RW, Kuhn JE. Intraarticular lidocaine versus intravenous procedural sedation with narcotics and benzodiazepines for reduction of the dislocated shoulder; a systematic review. Acad Emerg Med 2008;15:703–8.
16. Descamps MJL, Gwilym S, Weldon D, et al. Prospective audit of emergency department transit times associated with entonox analgesia for reduction of the acute, traumatic dislocated shoulder. Accid Emerg Nurs 2007;15:223–7.
17. Dunn T, Mossop D, Newton A, et al. Propofol for procedural sedation in the emergency department. Emerg Med J 2007;24:459–61.

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