A comparison of the scapular manipulation and Kocher’s technique for acute anterior dislocation of the shoulder

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Objectives: The aim of the present study was to compare the scapular manipulation technique and the Kocher’s method in terms of efficacy, safety, and the intensity of pain felt by the patient in the reduction of acute anterior shoulder dislocation.

Patients and methods: Between July 2009 and January 2010, a total of 64 patients with acute traumatic anterior dislocation of the shoulder were evaluated. Of the 64 patients assessed, three patients were excluded because of cardiopulmonary problems. The remaining 61 patients (41 males, 20 females; mean age 42±18.5 years; range 17 to 87 years) were enrolled in this prospective randomized study and divided into two groups. Thirty-one patients were treated with scapular manipulation (group 1) and 30 patients were treated by the Kocher’s method (group 2). A procedural sedation/analgesia was applied before the reduction to meet the target sedation score of 1 or 2 according to the Ramsay sedation scale. A visual analog scale was used to determine the intensity of the pain felt by the patients during reduction.

Results: Reduction was successfully achieved with the scapular manipulation method in 96.7% of the patients, and with the Kocher’s method in 93.3% (p>0.05). The degree of pain experienced by group 1 was lower than group 2 (p<0.01).

Conclusion: Both scapular manipulation and Kocher’s techniques are successful and reliable methods when procedural sedation/analgesia is used routinely. Scapular manipulation is a less painful method of reduction of an anterior shoulder dislocation in comparison with the Kocher’s technique.

Key words: Closed reduction; conscious sedation; shoulder; shoulder dislocations; visual analog scale.

Acute anterior dislocation of the shoulder is a common injury accounting for approximately 95% of all shoulder dislocations.[1] Many manoeuvres for the reduction of the humeral head have been described with varying rates of success and complications.[2-4] The ideal reduction method should be quick, effective, painless, and...
not cause further injury. Despite the considerable pain associated with this injury there has been a trend for reducing dislocations without any analgesia. Although analgesia and sedation may not be necessary to achieve reduction\cite{3,4} the relief of acute pain which occurs during the reduction manoeuvre must be regarded as an ethical issue and a legal right\cite{6,7}.

The aim of the present study was to obtain an objective comparison of the scapular manipulation technique with the Kocher method in terms of efficacy, safety, and the intensity of pain felt by the patient during the reduction manoeuvre when a standard sedation level was provided.

**PATIENTS AND METHODS**

Between July 2009 and January 2010, 64 consecutive patients with a traumatic anterior dislocation of the shoulder were enrolled in this prospective randomized study comparing Kocher and scapular manipulation techniques. The inclusion criterion was the anterior dislocation of the shoulder associated with or without fracture of the greater tuberosity. Patients were excluded if there was polytrauma, dislocation associated with a three or four-part fracture of the proximal part of the humerus, a duration of dislocation of more than 24 hours, severe cardiovascular or pulmonary disease.

Following diagnosis, all patients were randomized to undergo reduction of the dislocation with one of the two methods used in the study. The randomization was done with random permuted blocks of a predefined size. The random numbers were blocked in groups of four to ensure study groups of approximately the same size. The actual randomization was performed by drawing envelopes. An orthopaedic resident carried out the allocation process. A total of 64 patients with an anterior dislocation of the shoulder were assessed for eligibility. The patients were devided into two groups. One patient in group 1 and two patients in group 2 were excluded because of cardiopulmonary problems. The 31 patients (25 males and 6 females) treated with scapular manipulation (group 1), were compared with 30 patients (23 males and 7 females) treated by the Kocher method, (group 2). The visual analogue scale\cite{9} was reached. During and after administration of midazolam, the presence of any complications or side-effects were also closely monitored, including respiratory depression, apnea, oxygen desaturation, depression of the central nervous system, autonomic movement, chest pain, arrythmia, injection site pain and phlebitis. The subjects were discharged once they had fully recovered orientation of time and space with vital signs within the normal range.

**Reduction techniques**

*Scapular manipulation method:* The patient was placed prone on the examining table with the shoulder in a position of 90° forward flexion and external rotation and downward traction was applied.\cite{8} After the application of traction, the scapula was than manipulated to complete the reduction. When placing the patient in the prone position it was important to place the injured shoulder over the edge of the bed to allow the arm to hang in a perpendicular manner for the application of traction. Regardless of the means of arm traction,
**Statistical analysis**

Statistical analyses were performed on SPSS (SPSS Inc., Chicago, Illinois, USA) 13.0 version statistical package program for Windows. The Shapiro-Wilk test was used to test the normality of the variables and the Mann-Whitney U-test was used to compare the two groups. The chi-square test and Fisher’s exact test (contingency table analysis) were used for categorical data analysis. The success rate associated with the scapular manipulation manoeuvre has been reported to be as high as 96 percent.\(^\text{[4,11-13]}\) Scapular manipulation technique has been shown to be a safe, easy, and rapid method for the reduction of anterior shoulder dislocation even without analgesia and sedation.\(^\text{[4]}\) No data was found in the literature about complications resulting from scapular manipulation. However, this technique has the disadvantage of being difficult to perform on obese individuals and of requiring the patients to be prone. This position can pose difficulties for certain patients if they require sedation.

The Kocher technique is probably much older\(^\text{[14]}\) than its initial description and also has high success rates of up to 90 percent.\(^\text{[5,6,13,14]}\) However, it has been labelled as being unphysiological, brutal, and dangerous because of its association with fractures of the surgical neck of the humerus and neurovascular complications.\(^\text{[2,6,17]}\) Fractures will only occur when using...
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this technique, however, if the operator forcibly tries to overcome muscle spasm, the elderly osteoporotic patient being at most risk. No difference was found in the success rates between two manoeuvres. As all the patients had been sedated, no excessive force was applied during the reduction procedure. None of the patients encountered any complications due to the reduction manoeuvres.

Various methods of pain control are available for reduction. Regional anesthesia such as the suprascapular and interscalene brachial plexus block and intra-articular lignocaine have been used with good results. Intravenous agents such as meperidine, morphine, fentanyl, midazolam, and diazepam ensure good analgesia and relaxation. The procedural sedation/analgesia that we carried out gave rapid and adequate sedation and analgesia while maintaining patient responsiveness. This allowed the shoulder reduction procedure to be performed with a minimal level of patient discomfort. There were no respiratory or circulatory complications that required treatment, but monitoring of the respiratory and circulatory parameters of the patient was critically important.

Sedation/analgesia have usually been recommended when the procedure has been unsuccessful. Studies which rate pain scores, have demonstrated that patients sometimes feel severe pain while the reduction manoeuvre is being performed. It must be considered that acute pain is a worldwide phenomenon. Brennan et al. considered the medical, ethical and legal aspects of pain management and emphasised that the unreasonable failure to treat pain is an unethical breach of human rights. We think that pain control must be achieved during all reduction manoeuvres. It must be stressed, however, that all patients given intravenous sedation must be monitored in an area where resuscitation equipment is at hand. In the current study it was assumed that all the patients had recently eaten, therefore mild sedation was provided before the procedure in order to perform an immediate reduction. If a patient is not well sedated or has not received adequate analgesia, they

### TABLE I
Baseline characteristics of patients

<table>
<thead>
<tr>
<th>Method of reduction</th>
<th>Scapular manipulation (n=31)</th>
<th>Kocher (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Age</td>
<td>39.1±19.2</td>
<td>45±17.5</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>25</td>
<td>80.7</td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>19.3</td>
</tr>
<tr>
<td>Dislocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>15</td>
<td>48.4</td>
</tr>
<tr>
<td>Recurrent</td>
<td>16</td>
<td>51.6</td>
</tr>
<tr>
<td>Mechanism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>25</td>
<td>80.7</td>
</tr>
<tr>
<td>Sports activity</td>
<td>5</td>
<td>16.1</td>
</tr>
<tr>
<td>Traffic accident</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Time interval</td>
<td>97.8±83.9</td>
<td>102.2±106.8</td>
</tr>
</tbody>
</table>

SD: Standard deviation.

### TABLE II
Efficacy, time needed for reduction, and pain felt during reduction

<table>
<thead>
<tr>
<th>Method of reduction</th>
<th>Scapular manipulation (n=31)</th>
<th>Kocher (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Reduction result</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>30</td>
<td>96.7</td>
</tr>
<tr>
<td>Failure</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>Reduction time</td>
<td>2.4±1.8</td>
<td></td>
</tr>
<tr>
<td>VAS pain score</td>
<td>1.6±0.9</td>
<td></td>
</tr>
</tbody>
</table>

SD: Standard deviation; VAS: Visual analog scale.
are more likely to forcefully resist the reduction and the risk of complications may be high.\cite{5}

The VAS is a widely used, validated scale for measuring pain and a very effective instrument for surgical investigations. No statistically significant difference was found in success rates, but the use of the VAS suggested that the scapular manipulation method was reported to be significantly less painful.

In this prospective study patients were entered consecutively, and randomly assigned to one of the two study groups. On the other hand, the most important limitation is the fact that the study was unblinded, which was however, more or less unavoidable considering the nature of the study. Another limitation is that, because midazolam produces the immediate onset of anterograde amnesia in patients, the validity of some of the patients’ responses may be open to doubt. Though the same procedural sedation/analgesia was administered to both groups, the lower doses of midazolam may have affected the results.

In conclusion, when the patients were sedated, both the scapular manipulation and the Kocher technique were found to be effective, fast, and safe. The scapular manipulation was less painful for the reduction of an anterior shoulder dislocation in comparison with the Kocher technique.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

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