

# Scapular manipulation technique for reduction of traumatic anterior shoulder dislocations: experiences of an academic emergency department

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**Background:** Shoulder dislocations account for almost 50% of all joint dislocations, which are most commonly anterior (90–98%) and occur due to trauma. This prospective study was conducted to report our experiences of using the scapular manipulation technique (SMT) to reduce traumatic anterior shoulder dislocations.

**Methods:** Between March 2002 and March 2003, SMT was applied to 41 patients who presented with traumatic anterior shoulder dislocation to the Gulhane Military Medical Academy, Department of Emergency Medicine, Ankara, Turkey, which is a level 1 trauma centre with an annual attendance of 85 000 patients. The technique was applied to patients in the prone position by a single operator. Where necessary, a procedural sedation/analgesia (PSA) protocol was followed.

**Results:** The study population consisted of 26 (63.4%) male patients aged between 17 and 76 years (SD 15.6). History of recurrent shoulder dislocations at the same site were taken from seven (17.1%) of the patients. Mean (SD) trauma to reduction time was approximately 61.5 (72) minutes (range 10–480). Five patients (12%) had a greater tuberosity fracture. SMT was attempted twice to only four (9.8%) patients by a standard PSA protocol. We experienced a success rate of 90.2% at the first attempt and 100% overall. None of the patients encountered any complication.

**Conclusions:** We report the successful use of SMT in the prone position for the reduction of traumatic anterior shoulder dislocations, mainly without requirement of any sedatives or opiate analgesics. We believe that SMT may also be applied by inexperienced physicians, as it is simple, applicable, and easily understood. As no single method has a 100% success rate, SMT is a useful one to know.

Shoulder dislocations account for almost 50% of all joint dislocations presenting to emergency departments.<sup>1</sup> Most commonly, these dislocations are anterior (90–98%) and occur as a result of trauma.<sup>2,3</sup> Most anterior dislocations are subcoracoid in location. Subglenoid, subclavicular, and, very rarely, intrathoracic dislocations may occur.<sup>4</sup> The usual mechanism of injury is extreme abduction, external rotation, extension, and a posterior directed force against the humerus. Forceful abduction or external rotation alone can also lead to dislocation (about 30% of cases), as can a direct blow to the posterior humerus (29%), forced elevation and external rotation (24%), and a fall onto an outstretched hand (17%).<sup>5</sup> Neurovascular examination of the entire affected arm is of primary importance. Nerve injury occurs in up to 55% of shoulder dislocations. Most commonly, the axillary nerve is injured, resulting in loss of “shoulder badge” sensation with or without deltoid muscle paresis.<sup>6</sup>

Reduction methods for any dislocation should ideally be quick, effective, and as painless as possible for patients; they should not exhaust the physicians; and they should not cause further injury. This prospective study was conducted to report our experiences of using the scapular manipulation technique (SMT), also known as the scapular rotation method, to reduce traumatic anterior shoulder dislocations.

## METHODS

### Patients

Between March 2002 and March 2003, 41 patients with traumatic anterior shoulder dislocation presented to the Gulhane Military Medical Academy, Department of Emergency Medicine, Ankara, Turkey, which is a level 1

trauma centre with an annual attendance of 85 000 patients. SMT was applied to these patients by six full time emergency medicine physicians, and three full time orthopaedic surgeons with at least 3 years' clinical experience. Approval for the study was obtained from the hospital ethics committee, and a written informed consent was obtained from each patient.

A procedural sedation/analgesia (PSA) protocol was applied when the first reduction attempt failed. Consistent with this protocol, the timing of the last meal was obtained. Oxygen saturation (SpO<sub>2</sub>), heart rate, and blood pressure were monitored before medications were given. Airway management equipment, suction, naloxone, and flumazenil were available if needed. Supplemental oxygen (4 l/min via nasal cannula) was given before slow intravenous administration of 1.5 µg/kg fentanyl and 0.05 mg/kg midazolam to meet the target sedation score >3 according to the Ramsay Sedation Scale.<sup>7</sup> Those patients were observed for any PSA complication (such as respiratory depression, hypotension, bradycardia, and thorax rigidity) until they regained pre-procedural consciousness.

Demographic data, dislocation site, fracture existence, dislocation history (for example, recurrent dislocation), PSA application, and manipulation attempts were recorded on data sheets. Conventional anteroposterior (AP) and transscapular lateral view radiography were performed to identify anterior shoulder dislocation after all patients had undergone a brief neurovascular examination. Once reduced, the affected shoulder was immobilized using a sling and

**Abbreviations:** AP, anteroposterior; PSA, procedural sedation/analgesia; SMT, scapular manipulation technique

stockinette body bandage. Discharge decisions were given after evaluation of the post-reduction control radiographies, and brief neurovascular examinations were concluded as normal.

### Statistical analysis

Statistical analyses were calculated by SPSS software (version 11.0; SPSS, Chicago, IL, USA).

### Scapular manipulation technique

Shoulder dislocation reduction using this method focuses on repositioning the glenoid fossa rather than the humeral head and requires less force than other methods. Although there is also a description of this technique in the sitting position,<sup>8</sup> we performed our procedure with the patient prone and the arm hanging down as described in the Stimson method, with or without flexion of the elbow to 90°. When placing the patient in the prone position it is 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.

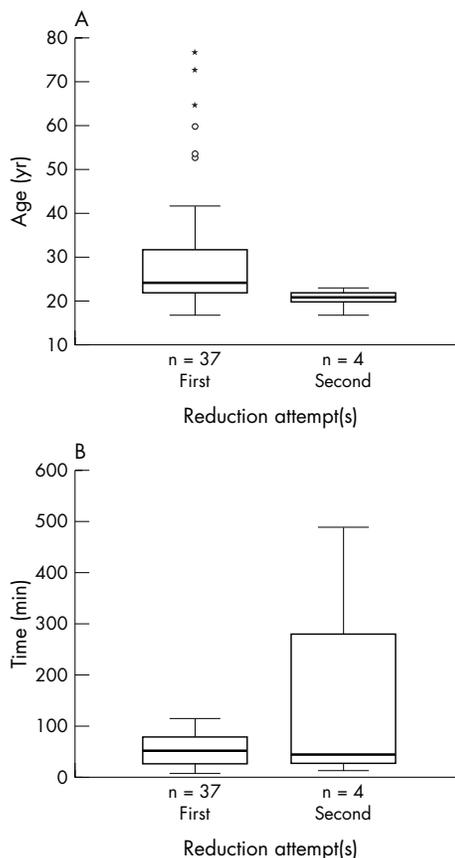
The initial manoeuvre for SMT is traction on the arm as it is held at 90° of forward flexion (fig 1A). Regardless of the means of arm traction, slight external rotation of the humerus may facilitate reduction by releasing the superior glenohumeral ligament and presenting a favourable profile of the humeral head to the glenoid fossa.

After application of traction, the scapula is then manipulated to complete the reduction. Manipulation of the scapula is carried out by stabilizing the superior aspect of the scapula with one hand and pushing the inferior tip of the scapula medially toward the spine. The thumb of the hand stabilizing the superior aspect of the scapula can be placed along the lateral border of the scapula and used to assist the pressure applied by the thumb of the other hand. A small degree of dorsal displacement of the scapular tip is recommended as it is being pushed as far as possible in the medial direction (see fig 1B).<sup>9</sup>

Some authors recommend attaching 3–7 kg (5–15 lb) weights to the affected arm to make the traction easier and assist in successful completion of the reduction, as it allows the scapula to pivot around an axis and aid reduction.<sup>10</sup>

### RESULTS

The study population consisted of 15 women (36.6%) and 26 men (63.4%), age range 17–76 years (SD 15.6; 95% confidence interval (CI) 25.3 to 35.2) (fig 2A). Right anterior shoulder dislocation was diagnosed in 23 (56.1%). Seven patients (17.1%) had a history of recurrent shoulder dislocations at the same site. Patients presented to our emergency department a mean (SD) of 61.5 (72) min (95% CI 38.49 to 84.53) after trauma (fig 2B). SMT was used in the same manner for five patients (12%) with greater tuberosity fracture with no complication afterwards. We experienced a success rate of 90.2% after the first attempt. No sedative or

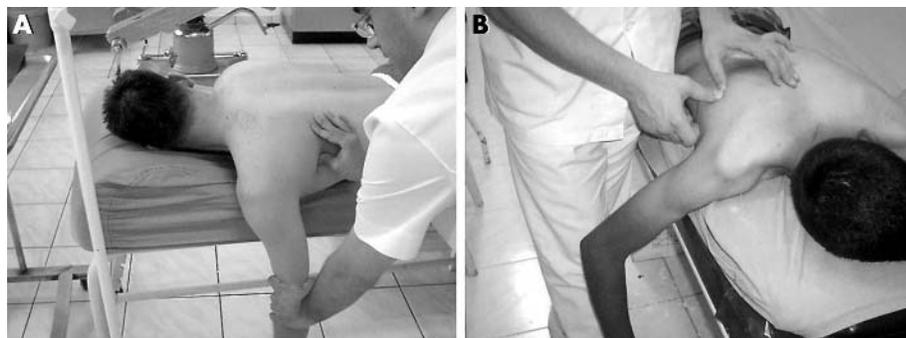


**Figure 2** (A) Age distribution according to reduction attempts (\*extremes, °outliers). (B) Injury to presentation time distribution according to reduction attempts.

any opiate analgesic was needed for 37 patients. SMT was attempted twice and PSA protocol was used in only four (9.8%) patients. None of the patients encountered any complication (including the patients requiring sedation).

### DISCUSSION

Anterior shoulder dislocation is a common occurrence in busy emergency departments. Numerous techniques for treating this problem have been reported. The majority of these techniques (for example, Milch, Kocher, and external rotation) use traction, and/or leverage of the humerus, often requiring considerable force and causing significant patient discomfort.<sup>11–14</sup> After Bosley and Miles had first described SMT in 1979, it gained popularity especially in the USA owing to its simplicity of performance, safety, and acceptability to patients as years passed.<sup>15</sup> More traditional



**Figure 1** Scapular manipulation technique. (A) Applying traction on the arm as it is held at 90° of forward flexion. (B) The inferior tip of the scapula is pushed medially and dorsally with the thumbs while the superior aspect of the scapula is stabilized with the fingers of the superior hand. Reproduced with permission.

techniques, such as the Hippocratic method (traction with the foot in the axilla), and the Kocher manoeuvre (leverage, adduction, and internal rotation) are no longer recommended because of a high incidence of associated complications (axillary nerve injury, humeral shaft, and neck fractures, capsular damage).<sup>16</sup> To date, no complications from this SMT have been reported in the literature.<sup>8, 17, 18</sup> Kothari<sup>18</sup> and Goh<sup>19</sup> found high success rates of 78.4% and 96% respectively compared with the 90.2% of our success rate in SMT.

There are some practical problems with in using the sitting position for this technique in that it requires two physicians and increases discomfort. The sitting or supine position can be used in some circumstances (such as multiple trauma, shortness of breath), when the patient cannot tolerate the prone position.<sup>20</sup>

SMT is commonly practiced by emergency physicians, orthopaedic surgeons, and family practitioners in the USA, but not in Europe; to our knowledge this is the first study carried out in Europe. This study should encourage emergency medicine physicians, orthopaedic surgeons, and general practitioners in Europe to add SMT to their skills and hopefully will reduce the need to resort to other methods such as the Kocher and Hippocratic techniques, which have been associated with significant complications as spiral fractures, injury to axillary vessels, and brachial plexus.

Ideally, physicians working in the emergency department should become familiar a number of techniques for reducing anterior dislocations of the shoulder, as no single method has a 100% success rate. However, SMT is a particularly useful technique, especially given its high success rate without any sedatives or opiate analgesic.<sup>18, 19</sup>

In conclusion, although larger patient studies are necessary to confirm our findings, we show that SMT may be considered as a safe, easy, and rapid method for the reduction of anterior shoulder dislocation and usually does not require use of regional anaesthesia or PSA.

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