

# A simple and gentle technique for reduction after anterior shoulder dislocation

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## Abstract

**Background** Anterior shoulder dislocation (ASD) is a common sports injury. The goal of this study was to evaluate a new procedure for reduction after ASD with respect to success rate, the need for medication for muscle relaxation, sedation, and application of pain medication and put it into context to a systematic literature review.

**Patients and methods** We retrospectively evaluated the new method in 263 patients in an Austrian skiing area from December 2005 till April 2009. We included patients with unilateral ASD and excluded those with a combined trauma and consecutive admission to hospital.

**Results** The new procedure is performed in a supine position, the therapist takes the patients hand of the injured limb with his one hand and with his other hand counter holds against the acromion. Then he enhances the traction on the upper limb by using his trunk as a kind of fulcrum. With eye contact and instructions to relax, the therapist is able to detect the muscular tension, so that he can adjust the amount of traction accordingly. The presented procedure was successful in all reported cases. For 196 patients (74.5 %) no medication for muscle relaxation, sedation, or pain medication were needed.

**Conclusion** The new method is a promising option to popular techniques for reduction of anterior shoulder

dislocations. The benefits of this protocol are a gentle and simple application of the procedure as well as an easy acquisition.

**Keywords** Anterior shoulder dislocation · Reduction · New technique · Review analysis

## Introduction

Anterior shoulder dislocation (ASD) is a common injury with over 50 % of all joint dislocations affecting the shoulder. Amongst them, more than 90 % are anterior shoulder dislocations and re-dislocations are common [1].

Winter sports like skiing and snowboarding are prone to accidents where the shoulder receives hard blows, whereas it is not really clear whether skiing or snowboarding has the higher incidence of shoulder injuries [2, 3].

A representative study of Kuriyama et al. reported that a rate of 4.5 % of all skiing injuries concern the shoulder. Approximately half of these injuries are anterior shoulder dislocations. Russell et al. report similar findings arguing that 2.3 % of all skiing traumas are anterior shoulder dislocations [4, 5]. Whilst the importance of an immediate adequate reduction is clearly demonstrated in the literature with respect to long term outcome, there exist many different methods for treating an anterior shoulder dislocation in the literature [1, 6–15]. As a major drawback, reduction after anterior shoulder dislocation remains a painful and often fearful procedure for our patients [1].

The aim of this retrospective analysis was to describe and assess a new approach for reduction after ASD developed by Aufmesser and to put it into context using a systematic review of the current literature.

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The hypothesis of this study was that Aufmesser's method reveals high success rates and a low need for medication (muscle relaxation, sedation, analgesia) during application.

## Patients and methods

In agreement with the local ethics committee, we performed an investigation to evaluate Aufmesser's method in an Austrian skiing area from December 2005 till April 2009 in a retrospective setting. During this period of time, 263 patients were treated ambulatory by this method. Inclusion criteria were consecutive patients suffering from isolated anterior shoulder dislocation without further injuries. We excluded patients with posterior shoulder dislocations, inferior shoulder dislocations or combined injuries. Further exclusion criteria were patients with a combined trauma and consecutive admission to the hospital. Demographic assessment revealed that patients were aged between 15 and 79 years (mean age of 43 years). We included 43 females, aged between 19 and 75 years (mean age of 48 years) and 220 males, aged between 15 and 79 years (mean age of 42 years). In 132 cases (50.2 %) a right shoulder joint was treated and in 131 cases the left joint.

To confirm the diagnosis and the successful reduction after the anterior shoulder dislocation antero-posterior and lateral X-rays were taken before and after the treatment. In 61 cases an irrelevant, non-dislocated fracture of the greater tubercle of the humerus was associated. Those cases were included in the presented analysis.

## Aufmesser's method

The procedure is performed in supine position. In case of a right dislocated shoulder, the therapist takes the patient's right hand of the injured limb with his own right hand and counter holds the acromion with the own left hand. This is further illustrated in Fig. 1. Due to this aspect, the scapula can be fixed and a counter traction can be arranged.

Next, the therapist enhances axial traction of the upper limb (Fig. 2). With eye contact and instructions to relax, the therapist is able to detect the muscular tension of the patient, so that he can adapt his axial traction to the circumstances.

In a next step, the therapist can use his own trunk as a kind of fulcrum (Fig. 3). This part of the procedure can be very helpful if the therapist is not able to provide enough strength. To evaluate the success rate of this procedure, we recorded the number of successfully reduced shoulder joints and further analyzed the medication, necessary for the procedure.



**Fig. 1** Patient suffering from anterior shoulder dislocation is lying in supine position. The therapist stands on the affected arm in the starting position. The therapist's left arm is fixing the acromion and the right arm holds the patient's hand



**Fig. 2** In a next step, an axial traction under face-to-face interaction is performed. The therapist can perfectly analyze the patient's muscle tonicity and face



**Fig. 3** In a last step, the trunk of the therapist can be used as a kind of fulcrum to generate extra force

In addition, we performed a systematic review of the literature to put our method into context with a final inclusion of 10 relevant manuscripts [1, 5, 8, 10, 14, 16, 17, 20–22]. Therefore, we searched PubMed for the terms “technique[All Fields] AND reduction[All Fields] AND anterior[All Fields] AND (“shoulder dislocation”[MeSH Terms] OR (“shoulder”[All Fields] AND “dislocation”[All Fields]) OR “shoulder dislocation”[All Fields])”. We extracted data on pain scores, pain medications, and possible complications. Eligibility of studies was assessed independently in duplicate and crosschecked to avoid errors. Disagreement was resolved by discussion or, if necessary, by the decision of the senior author (P.S.) in accordance with the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) statement [23, 24].

## Results

The application of Aufmesser’s method was successful in all reported cases. In addition, in 196 patients (74.5 %) it was not necessary to use any medication for muscle relaxation, sedation or pain relief drugs. For the remaining 67 patients (25.5 %) medication had to be applied. The following medication was used in variable combinations: Diazepam, Ketamine, Propofol, Piritramide, Fentanyl. Exact details of the medication used are exposed in Table 1. We report no complications in our cases with the presented method.

Our systematic search revealed 90 papers in total. After exclusion of irrelevant manuscripts on other topics ( $n = 43$ ), manuscripts comparing different techniques without demonstrating outcome on success rates and medication ( $n = 7$ ), manuscripts presenting techniques with defined medications in every case ( $n = 13$ ), manuscripts presenting techniques for self-reduction ( $n = 2$ ), manuscripts presenting incomplete datasets ( $n = 16$ ), nine papers remained for final analysis and data extraction. By hand analysis found one more suitable manuscript, which

was, therefore, included in this analysis ( $n = 1$ ). The findings of these ten papers are reported in Table 2 [1, 5, 10, 14, 16, 17, 20–23].

## Discussion

The aim of this retrospective analysis was to describe and assess a new approach for reduction after anterior shoulder dislocation developed by Aufmesser.

The hypothesis of this study was that Aufmesser’s method reveals high success rates and a low need for medication (muscle relaxation, sedation, analgesia).

We found, that all patients suffering from anterior shoulder dislocation could be successfully reduced with this new method and that medication was only necessary in 25.5 % of all cases.

Anterior shoulder dislocation is a common injury with more than 50 % of all joint dislocations concerning the shoulder. The very flabby capsule and the big discrepancy in size of the head of the humerus and the glenoid cavity are precondition for this fact. A strong force to the shoulder during an injury is a common etiological reason for shoulder dislocation. In older people, the weakness of the muscles of the pectoral girdle often constitutes a dislocation of the shoulder. Over 90 % of all dislocated shoulders are anterior shoulder dislocations. A painful lack of motion is characteristic and neurological symptoms are rarely reported [1, 16]. This leads our efforts for treatment on a clear path. The technique for reduction of anterior shoulder dislocation needs to be very gentle and able to be performed fast. To achieve these goals, it is necessary for the patient to relax the affected muscles. This requires a preferably comfortable and pain-free situation for the patient during treatment. A simple application, independent of muscular strength and experience of the therapist is mandatory. The authors believe that the described technique (Aufmesser’s method) meets all these requirements. It works in line with other gentle techniques such as presented by Pishbin et al. [8] evaluating the Stimson procedure. According to our own results, the findings by Pishbin et al. and Berkenblit et al. needed only 9.8 and 3.6 % of cases with medication for successful reduction [8, 20].

Furthermore, it is an advantage that reduction can be done without medication, because most patients are not fasting due to accidental trauma and therefore sedation or anesthesia involves risks and the need for clinical observation [1].

A number of different methods for treating anterior shoulder dislocations are published in literature [1, 6–15] with even a special method of shoulder reduction for the elderly [11]. For sure many of them do not seem to be dedicated to treat an anterior shoulder dislocation such as

**Table 1** Exact medication for patients suffering from anterior shoulder dislocation reduced by the new method

Medication	Number of patients	%
No medication	196	74.5
Diazepam	38	14.4
Diazepam, Ketamine	12	4.6
Diazepam, Propofol	10	3.8
Piritramide	4	1.5
Diazepam, Fentanyl, Propofol	2	0.8
Diazepam, Piritramide, Propofol	1	0.4

**Table 2** A systematic review on reduction of anterior shoulder dislocations revealed 10 relevant manuscripts

Technique of reduction	References	Number of reductions	Successful reductions	Reductions with medication
New technique of Walz (sitting position, traction on the forearm)	[1]	108	98 (90.7 %)	18 (16.7 %)
Milch technique	[5]	68	59 (86.8 %)	21 (30.9 %)
Scapular manipulation	[8]	112	98 (87.5 %)	11 (9.8 %)
			109 (97.3 %)	
Modified scapular manipulation	[10]	11	11 (100 %)	5 (45.5 %)
Spaso technique (supine position, vertical traction and external rotation)	[14]	16	14 (87.5 %)	16 (100 %)
Scapular manipulation	[16]	41	37 (90.2 %)	0 (0 %)
New technique of Noordeen (patient sits astride a chair, arm hangs over the backrest, wrist is held in supination, as the shoulder muscles relax the patient is ask to stand)	[17]	32	23 (72 %)	9 (28.1 %)
Kocher's method without humeral traction	[20]	28	23 (82.1 %)	1 (3.6 %)
Spaso technique (supine position, vertical traction and external rotation)	[21]	34	23 (67.6 %)	22 (64.7 %)
Milch technique	[22]	142	122 (86 %)	38 (26.8 %)

We extracted data on the number of reductions, the percentage of successful reductions, and the percentage of reductions with medications [1, 5, 8, 10, 14, 16, 17, 20–22]

the well-known techniques of Hippocrates, Arlt and Kocher [7, 15].

Some modified chair techniques are described by Westin et al. [2] and Noordeen et al. [17] but still not very useful for patients who require tension relieving drugs, sedation or narcotic analgesia, as maintaining in the sitting position could not be guaranteed and the risk of any additional trauma due to falling down off the chair is increasing [9].

The disadvantage of techniques using a lever action (chair) is a higher risk to traumatize the scapula (i.e., the glenoid labrum) or the humerus. Regauer et al. [10] report on iatrogenic complications, like subcapital fractures of the humerus and fractures of the shaft of the humerus, especially in older people.

Compared to these and other methods, Aufmesser's method affords many benefits. First of all, it is a very effective method. In our study, all treatments were successful and in 74.5 % of the cases no medication was needed.

It is a very gentle technique as well. A preferably comfortable and painless situation for the patient during treatment, enhances faith in the therapist and helps the patient to relax. There is no risk to traumatize soft tissues and other structures in the treated area like we find with Hippocrates's or Arlt's technique. Also, the risk to traumatize the scapula or the humerus is minimal, because Aufmesser's method is using traction action and not lever action. One reason for Aufmesser's method to be that successful is this particular traction action. During the maneuver, the head of the humerus moves into an ideal position in front of the glenoid cavity. Because of the physiological muscle tone in this position, the

head of the humerus returns almost autonomously into the glenoid cavity. The position of the dislocated head of the humerus is of no significance, which means that Aufmesser's method is also applicable for posterior shoulder dislocation. We did not include posterior shoulder dislocation in our investigation because they are rarely occurring.

Some authors opine that traction action during reduction of a shoulder dislocation causes muscle spasm and make the treatment more painful and difficult [18, 19]. We on the other hand found authors who argue the converse. For example, Caudevilla Polo et al. [6] also describe a technique which is using traction action. In their opinion, the traction reduces the muscle spasm and increases the success rate of the application [6]. We made the same observations. Therefore, we can not agree on traction action causing muscle spasms during treatment of an anterior shoulder dislocation.

Another advantage of Aufmesser's method is the fact that it is easy to learn, because the application of this technique is very simple. It is not necessary that the therapist has a lot of strength, because he can use his trunk as a kind of fulcrum to apply essential traction on the upper limb. Summarizing we can say that Aufmesser's method is proper for experienced, unexperienced and therapists with less bodily strength alike.

We believe that the optimal sequence of a reduction is achieved due to a complex interplay of many factors affecting in turn with each other. Treatment situation must be for the patient as comfortable and stress free as possible, so that the patient can relax and is not struggled by constant muscle contraction of reduction.

This presupposes a pleasant possible positioning of the patient and substantial avoidance of additional pain. For the therapist, this means that the treatment must be carried out quickly, easily, and with calming influence on the patient. Last but not least the absence of medication is a desirable goal.

If we compare our method with other gentle procedures like the methods of Walz, Milch's procedure, or the scapular manipulation method of Stimson the following should be noted: In the method described by Walz et al. the therapist stands behind the seated patient and exercises at the proximal forearm using a longitudinal traction, while the thumb of his other hand is put in the axilla and serves as an abutment and support by the lateral displacement of the humeral head pronation [1]. While the need for medication is less with 16.7 % compared to our method, the success rate is also lower with 90.7 % [1].

In Milch's procedure, the arm is initially placed in an abducted and externally rotated position before pulling the bent elbow and the humeral head is moved by means of direct pressure on the glenoid. The procedure works by applying an abduction and external rotation to reduce pain from the dislocation and then in this position wait with minor manipulation until the shoulder reduces by itself. Two major studies show a lower success rate (86.8 and 86 %) and the more frequent use of medication (30.9 and 26.8 %) [5, 22].

With respect to the scapula manipulation method by Stimson, unlike to most other methods, not the humerus but the scapula is the region of interest for the manipulation. The reduction is classically performed in the prone position with an externally rotated, hanging arm performed. In addition, it is also described in a sitting position, and even in the supine position [8, 16]. The method appears to be very gentle and promising. In an extensive study with 112 cases, however, success rate after repeated tries was only by 97.3 % [8].

However, a smaller study with only 41 patients could achieve a success rate of 100 % using the scapula manipulation technique [16].

With a success rate of 100 % in combination with a relatively low need for medication (25.5 %) our method is an excellent way to reduce anterior shoulder dislocation. In summary, we believe that our method compared to other known techniques provides a number of benefits and so should be establishment in the treatment of anterior shoulder dislocations.

This study has the following limitations: first, due to its retrospective nature, the level of evidence should be improved in future investigations. Second, we have only historical controls and lack a retrospective comparative study. Next, we want to mention a possible selection bias as we report a success rate of 100 % in our patients in a

study without a level I or II evidence in its design. In addition, the physician performing the reduction on the illustrations of this manuscript is a physically strong man, which might by another selection bias of this work. We want to underline the significant benefit, that the described procedure has a perfect rate of success, with a relatively high number of evaluated patients. We believe that this technique will assist physicians worldwide who seek for a more gentle way of reduction after ASD.

## Conclusion

Aufmesser's method is a promising option to popular techniques for reduction of anterior shoulder dislocations. The benefits of this protocol are a gentle and simple application of the procedure as well as an easy acquisition.

## Compliance with ethical standards

**Conflict of interest** None.

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