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ORIGINAL PAPER

FARES method for reduction without medication of first episode of traumatic anterior shoulder dislocation

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Abstract

Purpose The aim of this study is to demonstrate the efficiency of (FARES) method for reduction of first-episode anterior shoulder dislocation, as well as its safety, reliability, and quick easy reproducibility by inexperienced physicians without any use of medications.

Methods This was a prospective study of 28 patients with first episode of anterior shoulder dislocation that underwent closed reduction using FARES method by junior orthopaedic residents without use of any analgesic, muscle relaxant, or anesthesia. Only two attempts of reduction were allowed for each patient. The time needed for reduction was recorded, and the patients were asked to grade their pain according to a visual analog scale from 0 to 10.

Results Reduction was achieved after one attempt in 21 patients (75%) and after two attempts in three additional patients (total 85.7%). The mean time needed for reduction was 62.66 seconds, and the mean visual analog scale for pain evaluation was 5.29.

Conclusion FARES method is a fast, reliable, and safe method for reduction of a first episode of anterior shoulder dislocation and can be easily performed by inexperienced physicians and junior residents.

Keyword FARES method · Traumatic anterior shoulder dislocation · Closed reduction of shoulder dislocation

Introduction

Various techniques for reduction of anterior shoulder dislocation have been described; they are commonly performed after intramuscular or intravenous injection of sedative and, or, analgesic medications such as opioid and benzodiazepine [1, 2]. However, none of them has showed to be foolproof or fully efficient [3]. FARES technique is a new method of reduction which was recently described and claimed to be fast, reliable, and safe [4]. We hypothesized that this method can be considered universal for reduction of a first episode of shoulder dislocation and can be performed by non-experienced junior orthopaedic residents, without using any anesthetic, analgesic, or muscle relaxant medications. We also hypothesized that this method is smooth, quick, painless, highly efficient, and without complications.

Material and methods

After approval of the Ethics Committee of our institution, all patients admitted to the Emergency Room between February 2015 and November 2016 with a first episode of traumatic anterior shoulder dislocation and fulfilling the following criteria were enrolled into a prospective study for evaluation of FARES method for reduction of the dislocation: patient presented within 24 hours after injury, diagnosis confirmed by antero-posterior shoulder radiograph, absence of associated fracture of the ipsilateral shoulder girdle and upper limb (excepted for antero-inferior glenoid rim and greater tuberosity fractures), absence of associated neurovascular injury of the upper limb, conscious and cooperative patient with no history of recent alcohol intake or consumption of any type of sedative or analgesic medication prior to presentation, and finally

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confirmation of reduction by antero-posterior shoulder radiograph. Polytrauma and haemodynamically unstable patients were excluded. Patients were clearly and exhaustively informed about the method of reduction. All patients consented to undergo this method of reduction, and nine of them gave their permission for video registration of the reduction procedure when this was intended. The time needed for reduction was recorded for all patients. The reduction was performed by one of the three junior orthopaedic residents (first and second year) of our department who were instructed to use FARES method, according to their availability at the time of arrival of the patients to the Emergency Room. Only two attempts of reduction using FARES technique were allowed for the operator; after that, the method was considered unsuccessful if reduction was not achieved. When two attempts were necessary for reduction, the total duration of both attempts was considered the time needed for reduction. After failure of two attempts, reduction was consequently performed using the same or another method under sedation or general anesthesia. Patients with successful reduction using FARES method without sedation were asked to grade their pain according to a visual analog scale (VAS) from 0 (no pain) to 10 (intolerable pain), and were clinically assessed for any iatrogenic neurovascular complication.

Technique of reduction

The technique of reduction followed the description by Sayegh et al. [4]. Patient in supine position, the physician stands at the same side of the dislocated shoulder. Explanation of the method to the patient is considered an intimate part of the procedure; it intends to make him feel calm and comfortable. The operator seizes firmly with his two hands the hand and the wrist of the patient as if he wants to "shake" his hand; doing so, the operator puts the patient's elbow in extension and his forearm in neutral rotation (Fig. 1). When the operator feels that the patient is completely confident and relaxed, he then starts applying gentle longitudinal traction to the upper limb with progressive and gradual slow abduction without any countertraction or assistance by a third person (Figs. 2 and 3). At the same time as this maneuver is started, the operator simultaneously applies continuous vertical oscillations to the patient's upper limb through his wrist as a mean of continuous handshaking; the oscillations are rapid (two to three per second), brief, short-ranged, and cycled approximately 5 cm above and below the horizontal level. When abduction exceeds 90°, the upper limb is gently and gradually brought into external rotation while the oscillating movements and gradual abduction are continued (Figs. 3 and 4). As soon as the reduction is perceived, which usually occurs at approximately 120° of abduction, the upper limb is smoothly brought in internal rotation with the elbow flexed and the forearm crossing the chest (Figs. 5 and 6). It should be emphasized that the oscillations go together with the traction-abduction-external rotation throughout all stages of the reduction procedure, as we believe they intend to produce muscle relaxation to the upper limb and to release the humeral head from any soft tissue interposition or entrapment.

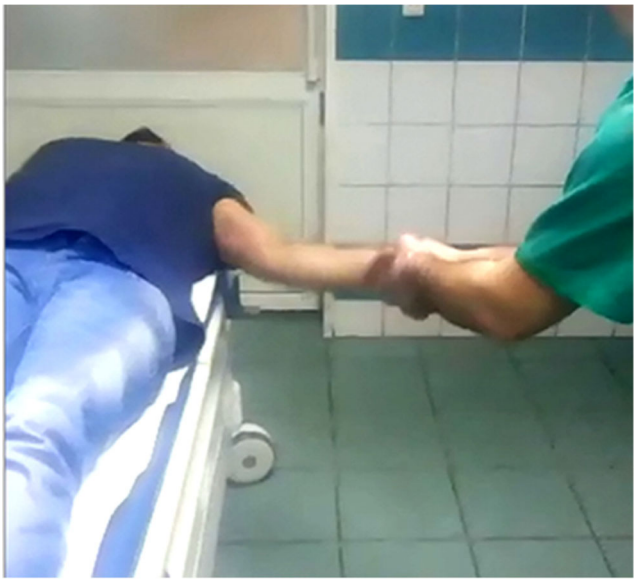

Fig. 1 The maneuver starts with the elbow extended and the forearm in neutral rotation; note the two hands of the operator firmly seizing the hand and wrist of the patient to perform continuous handshaking using vertical oscillating movements throughout the whole maneuver

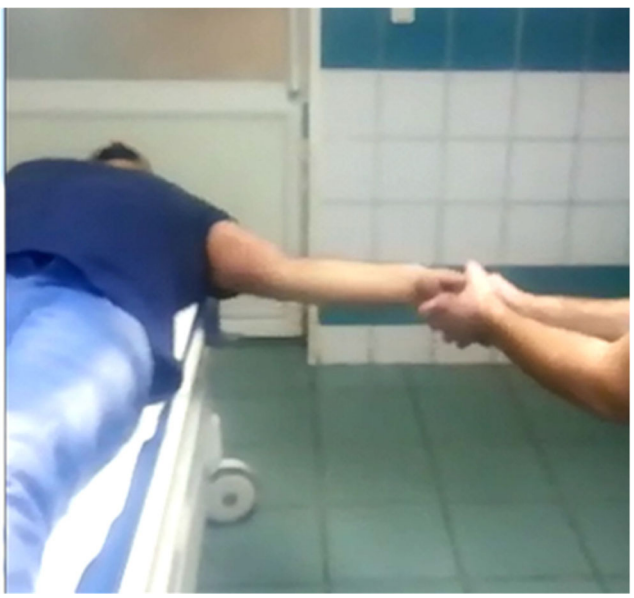

Fig. 2 Gradual abduction of the upper limb in neutral rotation

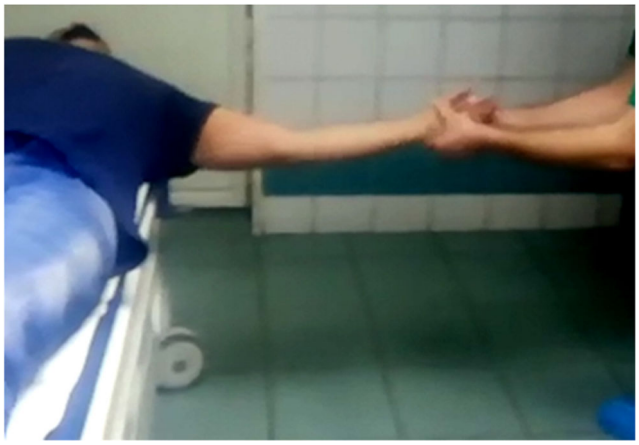

Fig. 3 At 90° the upper limb is externally rotated

Results

Table 1 shows summary of the series characteristics. There were 28 patients with a mean age of 37.14 years (range 14 to 75 years), divided into 17 males and 11 females. The right shoulder was affected in 18 patients and the left in ten. Reduction was successful in 24 patients, including one patient with displaced fracture of the greater tuberosity; the fracture was spontaneously reduced with the shoulder relocation. A second attempt was necessary to achieve reduction in three of the 24 pre-mentioned patients; the successful reduction rate was consequently 75% after the first attempt (21 out of 28 patients) and 85.7% after two attempts (24 out of 28 patients). The mean time at reduction was 62.66 seconds (range 30 to 120 seconds), and the mean VAS for pain evaluation was 5.29 (range 3 to 8). No post-reduction neurovascular complications were clinically documented in any patient.

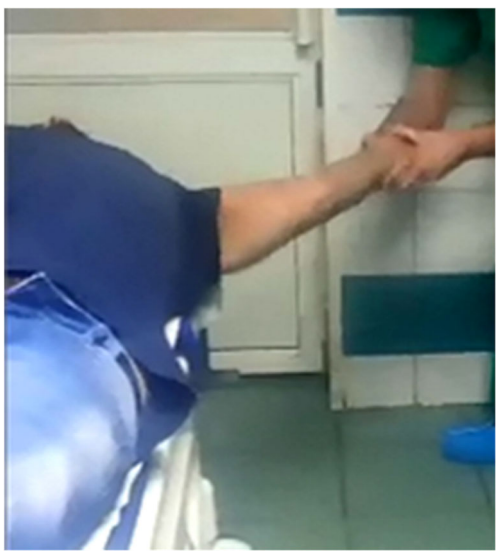

Fig. 4 Abduction is gradually continued with shaking movements and external rotation of the upper limb until reduction is felt at nearly 120°

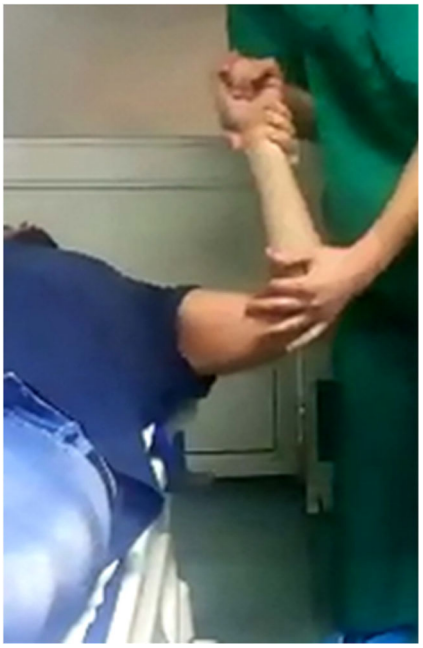

Fig. 5 As the reduction is felt, the elbow is flexed and the shoulder brought into internal rotation

Discussion

Traumatic anterior shoulder dislocation is the most frequent dislocation in the human body. Kazar and Relovszky [5] reported 44.9% of shoulder dislocations among 2324 dislocations affecting all joints, while Thorndike [6] stated that shoulder dislocations are more frequent than all joint dislocations

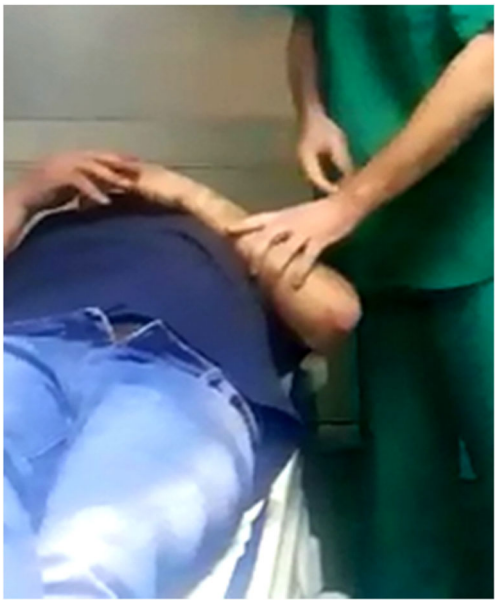

Fig. 6 The upper limb is brought crossing the chest of the patient with internal rotation of the shoulder and elbow flexion. Note should be made that reduction manoeuvre time for this patient was 43 seconds

Table 1 Characteristics of the series showing the patient age, gender, pain score, and time needed for reduction. (*VRA*, video registration applied; *F*, female; *M*, male; *VAS*, visual analog scale; *NA-FR*, not applicable-failed reduction)

Patient number	Gender	Age (years)	VAS (out of 10)	Reduction time (seconds)
1	F	24	6	30
2	M	75	NA-FR	NA-FR
3	F	55	6	62
4	M	28	4	60
5	M	33	4	55
6 (VRA)	M	32	5	58
7 (VRA)	M	25	7	49
8 (VRA)	F	28	5	42
9 (VRA)	M	29	4	43
10	M	27	4	40
11 (VRA)	M	27	7	65
12 (VRA)	F	70	5	50
13 (VRA)	M	14	7	50
14	F	70	NA-FR	NA-FR
15	M	21	6	50
16	M	37	4	40
17	M	50	4	50
18 (VRA)	M	35	6	70
19	F	30	6	50
20 (VRA)	M	20	7	90
21	F	45	6	40
22	M	20	NA-FR	NA-FR
23	F	56	NA-FR	NA-FR
24	F	60	5	100 (2 attempts)
25	F	49	7	80
26	M	24	4	115 (2 attempts)
27	F	38	3	120 (2 attempts)
28	M	18	5	95

considered together, and Szyluk et al. [7] reported that 0.2% of the Polish population experienced one or more shoulder dislocation events during the five year period of their study. Traumatic anterior dislocation usually occurs in young active males and represents more than 95% of all types of shoulder dislocations, followed by the posterior and the inferior (erecta) types successively [8, 9]. The more a patient is young at the first episode of dislocation, the more the risk of recurrence is high; consequently, in order to reduce the risk of recurrent dislocation in young patients, some authors support immediate arthroscopic repair of the essential Bankart lesion over conservative treatment for first-episode dislocation [10]. On the other hand, a study by Mizuno et al. [11] stated that in older patients with recurrent dislocation and absence of rotator cuff tears, "the prevalence of an isolated Bankart lesion was lower and that of isolated and associated capsular tears was higher than those of younger patients". Atef et al. [12] depicted 60% associated lesions in their series of 240 patients with traumatic anterior shoulder dislocation, a more frequent incidence than expected. Isolated and combined associated lesions such as rotator cuff tears, greater tuberosity fractures, Hill-Sachs and Bankart lesions, and axillary nerve injuries were reported by the authors with significant relation between their incidence and age, mechanism, and affected side [12].

Hippocrates [13] declared that "Reduction is to be effected, if possible, immediately while still warm, otherwise as quickly as it can be done…" [14]. In his exceptional work published in 1585, Ambroise Paré [15]—"the first counselor and surgeon of the King"—used the classification of Hippocrates for shoulder dislocations and described six methods for reduction; all of them use the downwards traction of the limb before reduction [16]. Multiple methods for reduction have been reported; however, none of them could be qualified as infallible. While some authors stated that early intervention [17–19] and degree of experience [20, 21] are crucial for the success of any reduction manoeuvre without medication, many others advise the use of intravenous sedation [22–25] especially for reduction of first-episode dislocations [22, 26]. Opiates and benzodiazepines are the most commonly used medications, yet they carry potential risks of cardiovascular and respiratory depression, particularly in the elderly [1]. We believe an ideal method of reduction should be fast, efficient, safe, reproducible by non-experienced personnel, relatively painless, requiring minimal or no assistance, and without use of medication.

Poulsen [27] reported a method of reduction used by the Eskimos in the Greenland and assessed its efficacy after a first attempt of reduction in 22 patients with acute dislocation without mentioning whether it was a first or recurrent episode. The method was successful after a first attempt of "a few minutes" in 17 patients (74%). The author stated that the rate of successful reduction of this method is comparable to that provided by the Hippocrates, Kocher, and Milch techniques. Although he claimed this method to be very simple, needs no instruments, and could be performed at the site of accident by inexperienced physicians and non-medical personnel, all patients were given a sort of intravenous sedation before reduction such as pethidine and, or, diazepam. In addition, Poulsen [27] recognized that Eskimo's technique might place the brachial plexus and artery at threat and needs therefore to be assessed in larger series for its neurovascular safety. Uglow [28] evaluated the Kocher method in 38 patients with anterior shoulder dislocation, randomized into two groups. He aimed at evaluating the success and effectiveness of this method without the need for intravenous sedation and analgesia. However, both groups were given a sort of medication to help reduction: The 17 patients of the control group were given intravenous morphine and midazolam and could all be reduced with this method (100%), and the 21

patients of the study group received nitrous oxide inhalation with successful reduction in 80.9%; yet there was no significant difference in the pain scores between the two groups. Nevertheless, recurrent dislocation was present in seven and six patients of the control and the study group respectively. Eachempati et al. [29] reported 36 successful reductions (90%) with the external rotation method in 40 patients with acute anterior dislocation; they recognized that this method is remarkably similar to the original method described by Kocher [30] and claimed it as a rational, simple, and relatively painless method. The authors reported that "No premedication was used in thirty-two of the reduction attempts, including twenty-nine successful attempts"; however, the number of patients with first-episode dislocation in this specific sub-group (who could be reduced without medication) was not emphasized in the article. On the other hand, the pain score reported by the patients during the procedure could be compared to our series, but the time needed for reduction was much longer: two minutes in 20 patients and five minutes in nine patients. Russell et al. [31] reported 61.8% success rate of reduction after a first attempt using Milch technique without analgesics or muscle relaxants among 76 patients with anterior shoulder dislocation including 12 cases of recurrent instability; this is inferior to our results, especially when we consider only patients with a first episode of dislocation. The success rate in the series by Russell et al. [31] increased to 89.4% after use of medication such as meperidine chloride and, or, diazepam. Beattie et al. [32] did not notice a difference in terms of efficiency when comparing the Milch and the Kocher techniques. They reported success rates of 72 and 70% without use of medication after the first attempt of reduction for the Kocher and the Milch technique respectively. After cross-over, by applying the other technique to the failed cases of the other group, the success rate was 82% for the Kocher technique and 80% for the Milch technique. All these rates tend to approach our results without exactly reaching them. Nevertheless, the authors stated that the Milch manoeuver was impressive by its atraumatic nature and the ease with which it was achieved. Khotari and Dronen [33] reported 96% successful reductions with the scapular manipulation technique in prone position with the arm vertically hanging a weight over the border of the table, and they stated that this technique is a very fast, effective, and safe method. However, the average time to reduction was 6.05 minutes, and all patients were given intravenous fentanyl and midazolam. Guo et al. [34] reported 18 iatrogenic humeral neck fractures among a series of 76 cases of acute shoulder dislocation associated with fracture of the greater tuberosity; 13 of the iatrogenic humeral neck fractures occurred during shoulder reduction using the Hippocratic method. In our series, one patient had an associated displaced fracture of the greater tuberosity which was spontaneously reduced at the time of shoulder reduction with FARES method. In the study by Ugras et al. [35], 17 of the 24 primary dislocations (70.8%) could be reduced by residents in training using Spaso technique without medication, and with a mean reduction time of 3.2 minutes. These results are inferior to our study for a comparable group of patients (primary dislocation, reduction by residents in training, and without medication), as FARES technique gave us 75% and 85.7% reduction rate after one and two attempts respectively, with a mean time of approximately 1 minute (62.66 s). FARES method is a new method that remains relatively unknown in the literature with only a very few reports [4, 36]. The eponym FARES stands for fast, reliable, and safe as well as for the first name of the promoter. The prospective randomized study by Sayegh et al. [4] showed more favourable results for FARES technique as compared to the Hippocratic and the Kocher techniques in terms of successful reduction rate, reduction time, and visual analog scale for pain. The authors reported 88.7%, 72.5%, and 68% success rates for the new FARES technique, the Hippocratic method, and the Kocher method respectively; all reductions in their series were performed by junior orthopaedic residents without sedation, anesthesia, or pain control. The higher pain score observed in our series (5.29) as compared to that of Sayegh et al. (1.57 ± 1.43) could be explained by the faster time at reduction in our study (62.66 s) in comparison to that of Sayegh et al. (2.36 ± 1.24 minutes); we think less pain might correlate with longer reduction time. In addition, our study includes only patients with a first episode of dislocation in whom the reduction was performed by junior residents without administration of any medications; we believe that reduction of a primary dislocation under such circumstances (inexperienced resident, without medication) is more difficult for both the patient and the operator than in case of recurrent instability.

In conclusion, with 85.7% of successful reductions after two attempts with a mean time of approximately one minute, without complications in conscious patients who did not previously receive any analgesics or sedatives, the present study confirmed the results of Sayegh et al. [4] and showed that FARES technique is a fast, reliable, and safe method for reduction of a first episode of anterior shoulder dislocation, and can be easily performed by inexperienced physicians and junior residents.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent Informed consent was obtained from all individual participants included in the study.

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