A Novel Reduction Technique for Elbow Dislocations

Nathan W. Skelley, MD; Aaron Chamberlain, MD

Abstract: The purpose of this study was to review a novel reduction maneuver for elbow dislocations. This was a retrospective review comparing a traditional elbow reduction method with a new single-person reduction technique. The reductions were performed during a 3-year period. Patients were evaluated in the Emergency Department of a large level I trauma center. All patients had posterolateral elbow dislocations. Sixteen patients were studied, with 6 in the traditional group and 10 in the novel single-person reduction group. All patients had successful reductions in the Emergency Department, but 2 of the patients in the traditional group were moved to the single-person reduction group after unsuccessful attempts. The traditional method required more sedations, assistance, and supplies. The authors had no nerve, vascular, or iatrogenic fractures in their series, and the technique was performed by 1 person without additional equipment. This technique is a valid option for orthopedic surgeons treating elbow dislocations. [Orthopedics. 2015; 38(1):42-44.]

Elbow dislocations are a common orthopedic injury, but the ideal reduction method remains elusive. The complex trochoginglymus anatomy of the joint, along with the close proximity to neurovascular structures, makes the elbow a challenge to reduce. Elbow dislocations occur at a rate of approximately 6 to 8 cases per 100,000 individuals and account for 10% to 25% of all elbow injuries annually.1

The elbow’s motion and structure predispose it to posterior dislocation with an axial force. The articular surfaces are largely apposed by ligament and muscular attachments.2 As a result, the elbow is the second most commonly dislocated joint after the shoulder.1 Most commonly, the elbow is dislocated in a posterolateral direction.

As with all dislocations, prompt relocation is critical to minimize injury to the joint and preserve function in the long-term. Several different techniques have been described for the reduction of a posterior dislocation; however, most methods require special positioning,3-5 sedation,6 countertraction,1,7 trained assistants,1,7 and additional equipment.3-5 These methods are also based around pulling or pushing the elbow into position, while a few methods use a fulcrum to facilitate the reduction.3,8

The authors present a method that does not require special equipment, unique positioning, anesthesia, or assistants. The novel technique is performed by a single person using his or her own elbow as a fulcrum and opposite hand as a means to distract and rotate the patient’s forearm to reduce the elbow. No nerve, vascular, or iatrogenic fractures were associated with this elbow reduction technique in the current series, and it can be performed without assistance.

Materials and Methods

Between 2011 and 2013, one of the authors (N.W.S.) participated in 16 elbow reductions at a large level I trauma center. All patients had closed posterolateral elbow dislocations. Six had their dislocations reduced via a traditional traction-countertraction method (Figure 1) and 10 via a novel single-person reduction technique (Figures 2-3). The traditional group was composed of 3 females and 3
males with an average age of 44.2 years (range, 6-77). The single-person reduction group was composed of 6 females and 4 males with an average age of 42.5 years (range, 11-58). Five (83%) of the patients in the traditional group and 6 (60%) in the single-person group received conscious sedation at the discretion of the Emergency Department attending physician prior to reduction, while the remainder received intravenous analgesia prior to reduction. Four of the patients in the single-person reduction group were treated nonoperatively, while 5 went on to have surgery for fracture injuries identified before reduction. The last patient went to the operating room for injuries unrelated to her elbow and was ultimately treated nonoperatively for the elbow injury. Three of the patients in the traditional group underwent surgery for associated fractures present before the reduction.

Electronic health records were reviewed to confirm elbow reduction and to track treatment until final outcome. Final outcome was defined as surgical intervention for patients undergoing surgery and removal of splint or braces for those not undergoing surgery. Once the elbow was reduced, an arc of motion was used to assess stability. After stability assessment, all patients in both cohorts were placed in elbow flexion of approximately 90° and forearm pronation. A posterior plaster splint was placed on the elbow. Radiographs were obtained after splinting to confirm elbow reduction. Simple dislocations were removed from the splint within 1 week at the clinic and placed in a brace if indicated, while patients who were to undergo surgery were maintained in the splint.

**Technique**

The patient is positioned supine and pulled to the edge of the stretcher to facilitate access to the injured elbow. For a right elbow dislocation, the physician first places his or her left mid-humerus in the patient’s right antecubital fossa with the shoulder flexed to near 90° (Figure 2A). The physician then flexes his or her left elbow while grabbing the patient’s right wrist or hand with his or her left hand (Figure 2B). The patient’s right elbow is maintained in approximately 90° or greater of flexion. Once the patient’s wrist or hand is grasped, extension or flexion of the patient’s elbow can be provided by the physician internally or externally rotating his or her shoulder. The physician’s right hand is then placed just distal to the antecubital fossa on the patient’s volar forearm (Figure 3A).

As the physician extends his or her left elbow, an axial traction force is created on the patient’s arm. This motion is similar to throwing a dart or tomahawk. The placement of the physician’s mid-humerus over the patient’s humerus, just proximal to the antecubital fossa, provides a static countertraction force during this motion. The physician’s right hand is pulled across his or her body to provide a distracting force on the patient’s elbow (Figure 3B). This motion is similar to drawing a bow; however, this hand can also be used to rotate the forearm, creating hypersupination of the forearm to unlock the radius prior to extension of the physician’s left arm. These motions allow for complete control of the patient’s elbow in all planes of motion during the reduction.
Once the physician has control of the patient’s flexion-extension, pronation-supination, and distraction, he or she can provide gentle force with both hands until the elbow is felt to reduce. Once the elbow is reduced, the physician uses his or her right hand to place the patient’s forearm in pronation and hyperflexion to secure the reduction and hold the patient’s arm while removing his or her left arm from the reduction position. This technique is performed in the same fashion but with opposite arm and hand positioning for a left elbow dislocation.

RESULTS

All 16 elbows were successfully reduced using one of these two techniques. The elbow was reduced on the first attempt for all but 1 elbow in the traditional group and 1 elbow in the single-person group, both of which required a second reduction attempt before success. The single-person reduction technique was also used to reduce 2 elbows, 1 pediatric, that were unsuccessfully reduced using the traditional traction technique. A 6-year-old patient with an elbow dislocation, however, was too small for the single-person reduction technique and required the traditional method because the physician could not sufficiently flex his elbow to grasp the child’s arm. One patient in the traditional reduction group had a dislocation after splinting and needed to be re-reduced in greater flexion. No neurologic or vascular complications were encountered with either reduction technique.

DISCUSSION

To the authors’ knowledge, this elbow reduction technique has not been previously described in the literature. The complex joint anatomy of the elbow needs correction in multiple planes to achieve a successful reduction. The authors’ technique provides a simple, inexpensive, single-person reduction method that controls all aspects of elbow motion for the reduction: flexion, extension, pronation, supination, and distraction. The technique does not require anesthesia when performed in the acute period for simple dislocations. Most importantly, the technique has been demonstrated to be safe, with no nerve, vascular, or iatrogenic fractures in this series.

The major limitations of this study were the small cohort, retrospective design, and nonrandomization. As demonstrated in the authors’ results, one limitation of this novel technique is the inability of the physician to appropriately flex the elbow to reach the patient’s wrist. This can be improved by sliding the patient’s midhumerus to the physician’s axilla, but it may still be inapplicable for small, pediatric arms. One of the authors (N.W.S.) determined which reduction method to use, and the use of sedation was at the discretion of the Emergency Department attending physician. In the future, more stringent criteria for reduction performance and larger cohorts will be needed to more accurately determine the indications for and risks and benefits of this procedure.

Even with these limitations, the results of the current study are similar to those of other studies and demonstrate that this is an applicable reduction technique that corrects many of the limitations in the literature. This technique did not require unique positioning for prolonged periods, such as placing the patient in a prone position. The technique could be performed without conscious sedation and did not require special equipment, such as chairs, straps, or weights. Furthermore, the technique did not require the assistance of a second, often untrained person to help with the reduction. It had final outcomes similar to those of the traditional method.

CONCLUSION

The results of this study indicate that the authors’ single-person reduction technique is a safe and efficient reduction maneuver for the treatment of certain elbow dislocations.

REFERENCES


