

Techniques and Procedures



THE “SYRINGE” TECHNIQUE: A HANDS-FREE APPROACH FOR THE REDUCTION OF ACUTE NONTRAUMATIC TEMPOROMANDIBULAR DISLOCATIONS IN THE EMERGENCY DEPARTMENT

Julie Gorchynski, MD,* Eddie Karabidian, msc,† and Michael Sanchez, MD‡

*Department of Emergency Medicine, Emergency Medicine Residency, JPS Health Network, Fort Worth, Texas, †Department of Biology, Graduate Studies, California State University Northridge, Northridge, California, and ‡Department of Emergency Medicine, University of Texas Health Sciences Center, San Antonio, Texas

Reprint Address: Julie A. Gorchynski, MD, MSC, FACEP, FAAEM, Department of Emergency Medicine, UTHSC, San Antonio, San Antonio, TX 78229

Abstract—Background: The traditional intraoral manual reduction of temporomandibular joint (TMJ) dislocations is time consuming, difficult, and at times ineffective, and commonly requires conscious sedation. **Objectives:** We describe a novel technique for the reduction of acute nontraumatic TMJ dislocations in the emergency department (ED). **Methods:** This study was a prospective convenience sample population during a 3-year period at two university teaching-hospital EDs where acute nontraumatic TMJ dislocations were reduced utilizing our syringe technique. **Demographics, mechanism, duration of dislocation, and reduction time were collected. Briefly, the “syringe” technique is a hands-free technique that requires a syringe to be placed between the posterior molars as they slide over the syringe to glide the anteriorly displaced condyle back into its normal anatomical position. Procedural sedation or intravenous analgesia is not required. Results:** Of the 31 patients, the mean age was 38 years. Thirty patients had a successful reduction (97%). The majority of dislocations were reduced in <1 min (77%). The two most common mechanisms for acute TMJ dislocations were due to chewing (n = 19; 61%) and yawning (n = 8; 29%). There were no recurrent dislocations at 3-day follow-up. **Conclusion:** We describe a novel technique for the reduction of the acutely nontraumatic TMJ dislocation in the ED. It is simple, fast, safe, and effective. © 2014 Elsevier Inc.

Keywords—TMJ; temporomandibular; dislocation; reduction; procedures; emergency department; acute; nontraumatic

INTRODUCTION

Acute nontraumatic temporomandibular joint (TMJ) dislocations are usually the consequence of excessive mouth opening, for example, tooth extraction, laughing, yawning, or taking a large bite of food. Anterior TMJ dislocations are the most common form in nontraumatic dislocations of the jaw. The emergency physician (EP) routinely relies on the traditional method of intraoral reduction of the TMJ, which commonly requires procedural sedation or substantial intravenous analgesia. The literature reports two alternative methods for the reduction of TMJ dislocations. In 2004, Lori et al. describe a variation of the intraoral approach, and in 2007, Chen et al. describe an extraoral or external approach. Both of these methods require the physician to manually manipulate the mandible (1,2).

Importance

The traditional intraoral approach is time consuming, difficult, and at times, ineffective. It is also not without risk to the patient or the EP (1,3–6).

Goal of this Investigation

We introduce a simple and novel technique for the reduction of acutely nontraumatic TMJ dislocations using a



hands-free approach. This technique is safe, rapid, and effective without the need for procedural sedation or intravenous analgesia.

MATERIAL AND METHODS

Study Design

This was a prospective convenience sample study.

Setting and Selection of Study Participants

This study was conducted in the emergency departments (EDs) at two university teaching hospitals with an annual ED census of 62,000 and 108,000. Thirty-one consecutive adult subjects that presented to the ED for acute nontraumatic TMJ dislocations during 2008–2011 were enrolled. These subjects represented a convenience sample population because two emergency physicians performed all the reductions. This maintained standardization because all the reductions were performed in the same manner. A focused history was taken from all subjects that included the mechanism of dislocation, time of dislocation, and prior history of dislocations.

New Technique

The technique we propose is effective and may be rapidly performed. The only piece of equipment utilized in our technique is a 5-mL or 10-mL syringe. With the patient in a sitting position, the physician places the syringe between the posterior upper and lower molars or gums on the affected side. The patient is asked to gently bite down and grasp the syringe as the patient is instructed to roll the syringe back and forth, resulting in the reduction of the dislocated TMJ. Selection of the syringe size varies with each patient. The size depends upon the distance between the upper and lower molars or gums and the patient's ability to open the mouth on the affected side to accommodate the syringe size. The mechanics of our technique utilize the syringe as a rolling fulcrum upon which the mandible and maxilla apply slight downward pressure as the syringe is grasped between the teeth or gums. As the molars or gums roll over the syringe, it produces a gliding motion as the mandible slides posteriorly. The condyle that is displaced anterior to the articular eminence of the temporal bone moves posteriorly to

Figure 1. (A) Dislocated temporomandibular joint (TMJ) where the condyle is displaced anterior to the articular eminence with syringe placement between the posterior molars. (B) Gliding of the mandible posteriorly as the molars roll over the syringe. (C) Normal TMJ with syringe placement. Z = zygomatic bone, C = condyle.

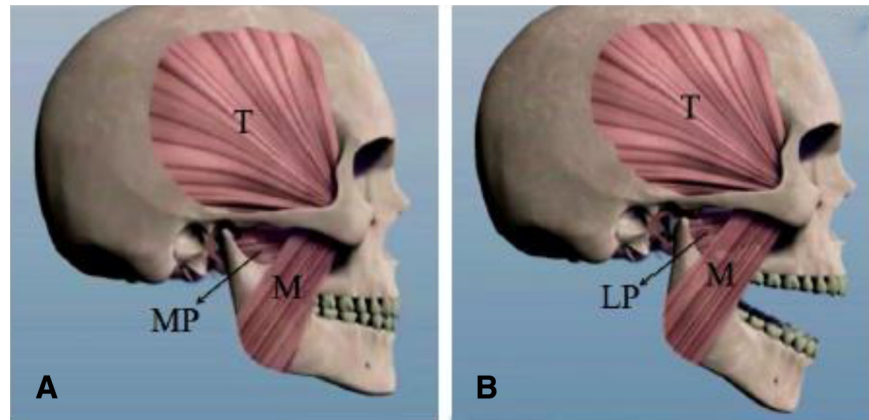


Figure 2. Represents the intervention of the jaw-opening and jaw-closing muscles. (A) The medial pterygoid (MP), masseter (M), and temporalis (T) muscles close the jaw. (B) The lateral pterygoid (LP) muscle lowers the mandible and opens the jaw.

allow the condyle to slip gently back into its normal anatomical position. The masseter, pterygoid, and temporalis muscles work in concordance to allow relocation of the condyle and reduction of the TMJ (Figure 1). If the dislocation is bilateral, by reducing one side, the other side reduces spontaneously.

Anatomy

Anatomically, the pterygoid, masseter, and temporalis muscles enable the mandible to open and close the jaw. The lateral (external) pterygoid muscle lowers the mandible and opens the jaw as the medial (internal) pterygoid, masseter, and temporalis muscles close the jaw (Figure 2). The jaw-opening muscles are designed to generate velocity and displacement, whereas the jaw-closing muscles have a special structural design that produces a significant amount of downward force (7). When the jaw is dislocated, these muscles generate a considerable amount of localized tension. The special structural design of the jaw-closing muscles produces a greater force when closing the jaw (7). Due to the great strength of the jaw muscles, the intraoral or external approach for manual reduction typically requires procedural sedation for the EP to overcome the extreme force and strength of the jaw-closing muscles, as well as to provide comfort to the patient. Conversely, our technique utilizes the patients' own jaw muscle strength to glide the condyle back to its normal anatomical position without any additional external or intraoral forces applied by the EP.

New Method

There are numerous advantages of utilizing our technique. Reduction of the TMJ is easily achieved within a matter of minutes and is highly effective. It is also a

hands-free technique that is comfortable for the patient. Because there is no external or intraoral manipulation of the mandible by the EP, inadvertent mandibular fractures are prevented and the risk of bite injuries to the EP is completely eliminated (1,2,5,6). Our technique eliminates procedural sedation and intravenous analgesia for successful reduction.

RESULTS

There were 31 subjects between the ages of 18 and 65 years that presented to the ED with acute nontraumatic TMJ dislocations during the study period. The mean age was 38 years; there were 20 females and 11 males, with 23 Hispanics, 13 Caucasians, and 2 African-Americans. Comorbidities were not obtained.

The mechanisms of dislocation were due to chewing ($n = 19$, 61%), yawning ($n = 8$, 29%), talking/laughing ($n = 3$, 10%), or recent dental visits ($n = 1$, 0.03%). Nine subjects had prior TMJ dislocations. The success rate was 97% (30/31). The majority of subjects presented to the ED within an hour of the dislocation (Table 1). Seventy-seven percent (24/31) of the patients' TMJ dislocations were successfully reduced in <1 min. Most of the

Table 1. Data for the Length of Time that the TMJ had been Dislocated, the Time Needed to Reduce the TMJ, and the Syringe Sizes Utilized for Reduction

	N = 31		
	n (%)		
Duration of dislocation	<1 h 13 (42)	1–2 h 14 (45)	>2 h 4 (13)
Reduction time	<1 min 24 (77)	1–2 min 5 (16)	>2 min 2 (7)
Syringe size	10 mL 17 (55)	5 mL 3 (10)	10 mL and 5 mL 11 (35)

TMJ = temporomandibular joint.

patients were given an oral nonsteroidal antiinflammatory drug and muscle relaxant after reduction and prior to discharge. None of the subjects had a recurrent dislocation of their TMJ, either by follow-up telephone calls or by ED returns. The one unsuccessful reduction was an edentulous 64-year-old woman who had bilateral TMJ dislocations, and she was unable to effectively grasp and roll either the 5-mL or 10-mL syringe between her gums due to pain. Additional external manual reduction with parenteral analgesia was necessary for successful reduction.

Traumatic TMJ dislocations were originally included in this study, but due to high failure rate using this technique, further traumatic TMJ dislocations were excluded. The apparent difficulty with traumatic TMJ dislocations was the amount of swelling of the soft tissue to the mandibular area and associated trismus and pain. These symptoms interfered with the placement of the syringe. Additionally, the majority of the traumatic TMJ dislocations required intravenous analgesia and many had associated fractures associated with the dislocation.

DISCUSSION

To our knowledge, our technique is the first described in the medical literature that does not require intraoral or external manual manipulation of the mandible for the reduction of acute nontraumatic TMJ dislocations in the ED. It is simple, safe, fast, and effective, and does not require procedural sedation. Most medical textbooks describe the traditional intraoral reduction method for TMJ dislocations. This technique requires a significant amount of force, especially in patients who have strong mastication musculatures for TMJ reduction (3,4,8,9). The traditional intraoral technique requires physicians to place their two thumbs on the molars of the mandible, and then push the mandible in an inferior and posterior direction to reposition the condyle back into the glenoid fossa (3,8–10). The intraoral approach has numerous disadvantages. First, there is a high risk of bite injuries, which might lead to transmissible diseases such as human immunodeficiency virus infection and hepatitis (1,2,5). Second, procedural sedation is typically required for this type of reduction because the physician applying additional force to manually manipulate the mandible causes pain for the patient. Third, during the reduction, repeated attempts may be necessary before successfully achieving the reduction. It is not always effective, and inadvertent mandibular or condylar fractures may occur (5,6). Lori et al. introduced a wrist-pivot method that utilizes the intrinsic biomechanical properties of the mandible. This technique, however, also requires the placement of the physicians’ hands inside the patients’ mouth

(2). If the physician does not apply equal intraoral forces bilaterally, a mandibular or condylar fracture may result (5,6). The authors report that their technique requires intravenous procedural sedation (2). Chen et al. introduced an extraoral or external approach, where the thumb is positioned just above the anteriorly displaced coronoid process and the fingers are positioned behind the mastoid process. Simultaneously on the opposite side, the fingers hold and rotate the mandible angle anteriorly and the thumb is placed over the malar eminence as a fulcrum (1). Scamahorn reported the “corkscrew” technique in the Reader’s Forum of *Postgraduate Medicine* (11). In this technique, a cork is placed bilaterally between the teeth as the physician externally manipulates the mandible for reduction (11). Nontraumatic TMJ dislocations are infrequent to the ED. We had a high number of subjects in this study, just fewer than the 37 subjects reported by Lowery et al. in 2004 (2).

Limitations

All the dislocations in this study population were anteriorly displaced; we cannot confirm the usefulness of the technique for the less common posterior or lateral dislocations. Traumatic TMJ dislocations may involve posterior and lateral dislocations as well as an associated fracture, making the reduction more difficult. Further studies involving acute traumatic TMJ dislocations utilizing our technique or in combination with external manipulation and intravenous analgesia, may demonstrate its value.

CONCLUSION

Our described technique is a novel hands-free maneuver that is quick, simple, safe, and effective. EPs should consider this method as a useful technique in the management of acute nontraumatic TMJ dislocations in the ED.

REFERENCES

1. Chen Y, Chen C, Lin C, et al. A safe and effective way for reduction of temporomandibular joint dislocation. *Ann Plast Surg* 2007;58:105–8.
2. Lori EL, Michael SB, Kevin KL. The wrist pivot method, a novel technique for temporomandibular joint reduction. *J Emerg Med* 2004;27:167–70.
3. Kruger GO, ed. *Textbook of oral and maxillofacial surgery*. 6th edn. St. Louis, MO: CV Mosby; 1984.
4. Ugboke V, Oginni F, Ajike S, et al. A survey of temporomandibular joint dislocation: aetiology, demographics, risk factors and management in 96 Nigerian cases. *Int J Oral Maxillofac Surg* 2005;34:499–502.
5. Schraga E., Kulkarni R. Kadkade PP. Mandibular dislocation joint reduction: Medscape. April 2013. Available at: <http://emedicine.medscape.com/article/149318-overview>. Accessed August 5, 2014.

6. Ardehali MM, Kouhi A, Meighani A, Rad FM, Emami H. Temporomandibular joint dislocation reduction technique, a new external method vs. the traditional. *Ann Plast Surg* 2009;63:1–3.
7. Van Eijden TM, Korfage JA, Brugman P. Architecture of the human jaw closing and jaw-opening muscles. *Anat Rec* 1997; 248:464.
8. Tintinalli JE, Stapczynski JS, Cline DM, Ma OJ, Cydulka RK, Meckler GD. Tintinalli's emergency medicine: a comprehensive study guide. 7th edn. Irving, TX: The American College of Emergency Physicians; 2012.
9. Roberts JR, Hedges J. Clinical procedures in emergency medicine. 4th edn. Philadelphia: Saunders; 2011.
10. Kaplan AS, Assael LA. Temporomandibular disorders: diagnosis and treatment. Philadelphia: WB Saunders; 1992.
11. Scamahorn GF. Treating acute mandibular dislocation [Reader's Forum]. *Postgrad Med* 1989;86:44.

ARTICLE SUMMARY

1. Why is this topic important?

The traditional intraoral manual reduction of temporomandibular joint (TMJ) dislocations is time consuming, difficult, and at times, ineffective, and commonly requires conscious sedation.

2. What does this study attempt to show?

This technique is a hands-free approach for the reduction of the acutely nontraumatic TMJ dislocation. The dislocation can be successfully reduced within minutes, it is comfortable for the patient, and does not require procedural sedation or intravenous analgesia.

3. What are the key findings?

This technique is simple, safe, rapid, and effective for reduction of acute nontraumatic TMJ dislocations in the emergency department (ED).

4. How is patient care impacted?

There is no need for procedural sedation or intravenous analgesia, thus limiting any procedural sedation risks. The technique is simple and fast and it is comfortable to the patient. It also allows the patients to be involved with their own medical care. The overall time in the ED for the patient is significantly reduced to a matter of minutes with this technique. The overall cost to the patient is reduced as their length of stay in the ED is decreased; without the necessity of procedural intravenous analgesia, critical care monitoring and nursing care is not utilized.