

Managing Temporomandibular Joint Dislocations

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INTRODUCTION

Temporomandibular joint (TMJ) dislocation is an important condition to diagnose and manage in the emergency department (ED), with a lifetime prevalence of 5% to 8% and an estimated incidence approaching 25 out of 100,000 people per year.¹⁻⁴ The TMJ is a hinge and gliding joint with a dense fibrocartilaginous disc lying between the condyle and glenoid fossa. Dislocation occurs when the condylar process of the mandible is displaced from its normal location in the glenoid fossa of the temporal bone and becomes locked in an abnormal position, resulting in muscle spasm and preventing mouth closure.⁵⁻⁷ Anterior dislocation is the most common form and will be the focus of this article. Lateral, posterior, and superior joint dislocations are much rarer and more commonly associated with high-energy trauma resulting in facial fractures.⁵⁻⁷ Bilateral dislocation is more common than unilateral dislocation.^{1,8-10} In an anterior dislocation, the head of the mandible slips out of the mandibular fossa and is locked anterior to the articular eminence, resulting in spasm of the masseter, pterygoid, and temporalis muscles.^{5,10} Nontraumatic TMJ dislocations can be classified as acute, chronic recurrent, or chronic. Anterior TMJ dislocation can occur spontaneously with any movement that results in extreme opening of the mouth, including chewing, kissing, singing, vomiting, and yawning.^{5,6,11,12} Risk factors include conditions resulting in increased ligament laxity (eg, Ehlers-Danlos, Marfan syndrome), prior TMJ dislocation, medications with dystonic reactions (eg, haloperidol, metoclopramide, prochlorperazine), procedures (eg, intubation, endoscopy), seizures, and neurodegenerative conditions (eg, multiple sclerosis, Huntington disease).^{5,6,13-18} It is important for clinicians to be aware of the approach to the management of these patients. This article is not intended to be a comprehensive review of all the aspects of the evaluation and management of patients with an anterior TMJ dislocation; instead, it seeks to distill key facets of

management based upon the current literature and years of practice.

ASSESSMENT AND IMAGING

TMJ dislocations are often clinically apparent. Patients will present with a fixed, open jaw that will either be midline (ie, bilateral dislocation) or laterally deviated (ie, unilateral dislocation with the jaw deviated away from the affected side), with marked protrusion of the lower jaw (ie, prognathia).¹⁹ There will typically be pain in the preauricular area, and an indentation at the TMJ location may be palpable.¹⁹ The coronoid process and anterior border of the ramus can also be palpated extraorally, which are normally not palpable in a nondislocated jaw. The key aspects of the initial assessment involve the assessment of airway protection and the evaluation for other injuries in the case of traumatic dislocations. For atraumatic, recurrent cases with a clear mechanism, imaging may not be necessary.²⁰ When the diagnosis is unclear or there is concern for an associated fracture (eg, trauma), imaging should be obtained (Figure 1). Maxillofacial computed tomography (CT) is generally recommended as the preferred imaging.²¹ Plain radiographs (including panoramic jaw views) may be considered if CT is unavailable but are less preferred because of the improved visualization of fractures and anatomic location with CT.^{21,22}

ANALGESIA AND ANESTHESIA

TMJ dislocations can be very painful, and patients often present with significant muscle spasm that is already present. It is important to adequately control the pain and reduce the muscle spasm to facilitate the reduction. This often involves intravenous medications, ranging from anxiolysis to procedural sedation. However, procedural sedation is not required for all patients (particularly those with chronic or chronic recurrent TMJ dislocations), with one study reporting that only 39% of cases required procedural sedation.⁸ Alternatively, intra-articular injection of a local anesthetic or nerve blockade (eg, masseteric, deep

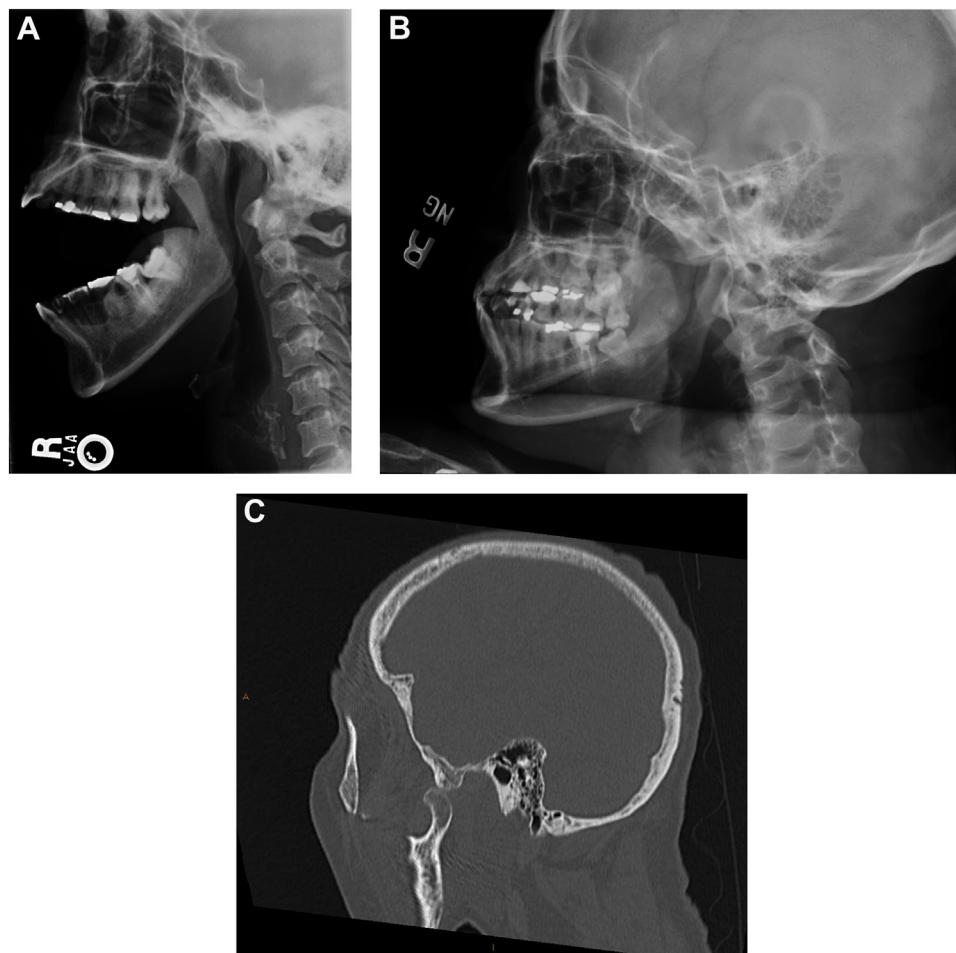


Figure 1. A, A radiograph demonstrating a TMJ dislocation. Case courtesy of Elizabeth K. Asfaw, [Radiopaedia.org](https://radiopaedia.org), rID: 51549. B, A radiograph demonstrating TMJ reduction. Case courtesy of Elizabeth K. Asfaw, [Radiopaedia.org](https://radiopaedia.org), rID: 51549. C, A CT image demonstrating TMJ dislocation. Case courtesy of Derek Smith, [Radiopaedia.org](https://radiopaedia.org), rID: 92614.

temporal nerve block) can be easily performed to facilitate reduction with or without intravenous medications.^{19,23-26}

REDUCTION TECHNIQUES

In this section, we focus on 7 techniques for the reduction of anterior TMJ dislocations (Table). We provide a potential algorithm in Figure 2. However, clinicians should use techniques with which they are most successful. Among patients with chronic recurrent dislocations, we also recommend asking which technique has worked best for prior reductions. When performing any intraoral techniques, it is important to protect the clinician's thumbs from injury when the patient's mouth quickly closes after reduction. This may be performed by wrapping several pieces of gauze around the clinician's thumb or fingers and securing with tape or a larger glove on top. Alternatively, mallet finger splints can be placed over the thumbs or fingers to protect them during the reduction attempt.²⁷

The use of a bite block has also been described.⁷ Similar to other reduction techniques, it is important to perform TMJ reduction using slow and steady pressure to reduce the risk of worsening the muscle spasm.^{28,29}

Traditional Bimanual Technique

This is also known as the Hippocratic technique and is one of the oldest and most common techniques, dating back to 1500 BC.³⁰ Begin by standing in front of a seated patient facing towards the patient, such that the patient's mandible is no higher than your elbows. This positioning is important to allow the clinician to exert maximal reduction force. An assistant stabilizes the patient's head. Ask the patient to open their mouth as wide as possible to help relax the elevators of the mandible.⁵ Place both thumbs inside the patient's mouth along the lower molars or external oblique ridge as far posterior as possible (Figure 3).³¹⁻³³ Place your remaining fingers outside the patient's mouth

Table. TMJ reduction techniques.

Reduction Technique	Advantages	Disadvantages
Traditional bimanual technique	<ul style="list-style-type: none"> The clinician can lean forward and use their body weight to increase force 	<ul style="list-style-type: none"> Thumb in mouth increases risk of clinician injury Ergonomically challenging angles can place excess stress on clinician's ligaments and wrist Can only apply downward and backward force because positioning limits rotational movement at the jaw
Wrist pivot	<ul style="list-style-type: none"> More ergonomic, reducing strain on the clinician's wrists while facilitating the ability to pivot 	<ul style="list-style-type: none"> Fingers in mouth increases risk of clinician injury May be difficult to fit multiple fingers in the mouth if the clinician has large hands or the patient has a smaller mouth Can be more difficult to apply downward pressure with only 2 fingers Not recommended for unilateral dislocations
Extraoral technique	<ul style="list-style-type: none"> The clinician does not place their fingers in the patient's mouth Does not require an assistant to stabilize the head 	<ul style="list-style-type: none"> Can be more technically challenging to perform²⁸ May require separate reductions for each side with bilateral dislocations Theoretical risk of injury to the anterior tubercle of the glenoid fossa but has not borne out in the literature²⁸
Ipsilateral approach	<ul style="list-style-type: none"> Extraoral technique avoids injury to fingers By focusing on a single side, greater downward force can be applied (particularly with the combined method) Contralateral hand can help stabilize the patient's head 	<ul style="list-style-type: none"> May still require intraoral technique if extraoral is unsuccessful (with resultant risk of clinician injury)
Gag reflex	<ul style="list-style-type: none"> The clinician does not place their fingers in the patient's mouth 	<ul style="list-style-type: none"> Can trigger vomiting and risk of aspiration Can damage teeth on the object or break more fragile objects (eg, cotton swabs)
Lever technique	<ul style="list-style-type: none"> The clinician does not place their fingers in the patient's mouth Less painful and does not require procedural sedation 	
Syringe method	<ul style="list-style-type: none"> The clinician does not place their fingers in the patient's mouth Less painful and does not require procedural sedation The patient can perform by themselves (particularly beneficial for those with recurrent mandibular dislocations) 	

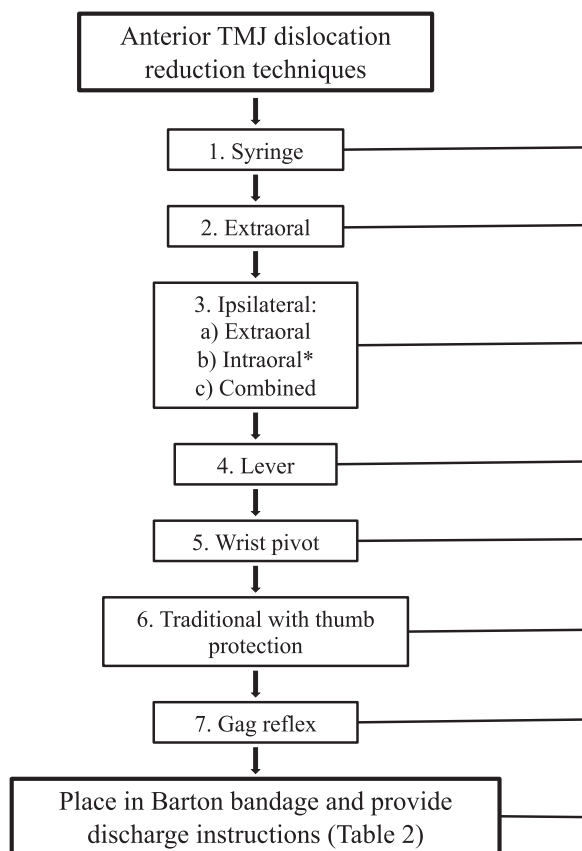
and wrap them along the angle of the mandible. Apply downward pressure to the mandible using your thumb in order to disengage the mandibular condyle, followed by backward pressure to guide the relocation.³² The pressure can be applied sequentially or simultaneously.^{31,34} Additional upward force can be applied to the mentum with the third and fourth fingers to help rotate the inferior mandible anteriorly and facilitate the reduction.³¹ This has been reported to have an 86.2% to 86.7% success rate.^{31,34}

This technique can be modified by standing behind the seated patient or standing above a supine patient at the head of the bed.^{7,35} The latter modification was compared with the traditional seated approach and found to have no difference in the success rate but was quicker to perform

(5 minutes versus 3 minutes).³⁶ Stolbizer³³ proposed another modification where the patient assists this by opening and closing their mouth 5 times, followed by 5 lateral jaw movements. The authors reported a 100% success rate with this modified approach among 42 patients.³³

Wrist Pivot

Begin by sitting and facing the patient while an assistant helps to stabilize their head. Place your thumbs under the patient's chin and your index and middle fingers on the patient's bilateral lower molars (Figure 4).^{31,37} Pivot your wrists in an ulnar direction while simultaneously applying



*single hand or unified hand

Figure 2. Proposed algorithm for TMJ reduction techniques.



Figure 3. Traditional bimanual technique.

upward pressure on the patient's chin with your thumb and downward pressure on the patient's molars with your fingers. This has been reported to have a 96.7% success rate.³¹

Extraoral Technique

This technique begins with both the clinician and patient seated and facing each other. Place the fingers from 1 hand on the posterior aspect of the mandibular angle while your thumb is placed on the malar eminence of the maxilla or zygoma to stabilize the patient's midface (Figure 5A).^{31,38} This serves to pull the mandible forward to facilitate the contralateral reduction. With your other hand, apply a posteriorly directed pressure to the displaced coronoid process with your thumb while using your fingers to apply traction on the mastoid process, thereby guiding the mandible back into position (Figure 5B). Once 1 side of the dislocation is reduced, the other often reduces spontaneously. If the other side does not reduce spontaneously, this can be repeated on the opposite side. The original authors

reported 7 successful reductions without complications.³⁸ Subsequent research has reported a success rate ranging from 55.2% to 66.7%.^{31,34}

Ipsilateral Approach

There are 3 techniques that can be used for this approach: the extraoral method, the intraoral method, and the combined method.³⁹ For the extraoral method, place your thumb on the condyle of the mandible just inferior to the zygomatic arch and apply direct downward pressure (Figure 6A). The other hand can be used to stabilize the patient's head. The intraoral method is identical to the traditional bimanual technique described earlier, except that the reduction is only performed on a single side (Figure 6B). This may also be performed with 2 thumbs on one side, which is referred to as the unified hands technique (Figure 6C).⁴⁰ For the combined method, place one thumb inside the mouth on the posterior molars and apply a downward force while using your other thumb to apply downward pressure on the condyle extraorally (Figure 6D). If the other side does not reduce spontaneously, this can be repeated on the other side. The original authors examined this among 24 TMJ dislocations, of which 13 were reduced with the extraoral technique, 10 were



Figure 4. Wrist pivot technique.

reduced with the intraoral technique, and one was reduced with the combined technique.³⁹ A subsequent study by Yabe et al⁴¹ reported 15 successful reductions using just the ipsilateral intraoral portion of the technique.

Gag Reflex

To perform this, use a firm object (eg, tongue depressor, dental mirror) to stimulate the patient's gag reflex by touching their soft palate and pharynx.⁴² This technique works by triggering the masseter and temporalis muscles to contract while inhibiting the pterygoid and digastric muscles, which can help to relocate the mandible.⁴² The data are limited to a small number of case reports that have described successful reduction without reported complications.^{2,42} However, because of the theoretical risk of vomiting and aspiration, this technique is less preferred.

Lever Technique

Begins with a 3-cm diameter roll of gauze and place in the posterior aspect of the patient's mouth near their third molar (Figure 7).⁴³ Then, push upward on the mentum using the gauze as a lever to disengage the mandible and rock it posteriorly. The original authors reported a 100% success rate among 29 patients without complications.⁴³

Syringe Method

This method was originally described by Scamahorn,⁴⁴ where a wine cork was used to perform the reduction; however, this method was later modified to use syringes because they are more widely available in the ED.⁴⁵ First, place an empty 5- or 10-mL syringe in the

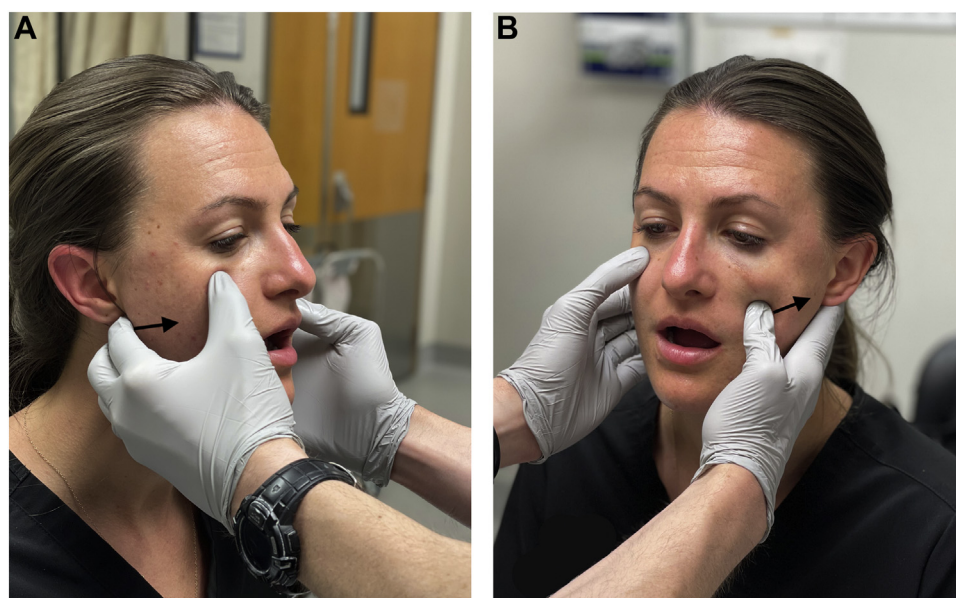


Figure 5. Extraoral technique. *A*, The thumb is placed on the malar eminence of the maxilla or zygoma, and the fingers are wrapped around the posterior aspect of the mandible to stabilize the patient's midface. *B*, The thumb is placed on the displaced anterior coronoid process, and the fingers are wrapped around the mastoid process.



Figure 6. Ipsilateral approach. A, Extraoral technique. B, Intraoral technique. C, Unified hands technique. D, Combined technique.

posterior portion of patient's mouth between their upper and lower molars (Figure 8). The patient should be directed to gently bite down and roll the syringe back and forth between their teeth. This is repeated until the mandible self-reduces. Although this often leads to simultaneous reduction of both sides, this could be repeated on the contralateral side if only one side reduces initially. Gorchynski et al⁴⁵ reported successful reduction

in 97% of cases among 31 patients, with 77% reduced in less than one minute.

DISPOSITION AND AFTERCARE

After the reduction is complete, assess for adequate reduction and complications. The most common complication of an acute TMJ dislocation is instability with



Figure 7. Lever technique.



Figure 9. Barton bandage.

recurrent dislocation.^{5,19,20} Iatrogenic complications can include fracture or ligamentous injury due to the force required for reduction.² Therefore, postreduction imaging



Figure 8. Syringe technique.

(eg, panoramic radiography, maxillofacial CT) is recommended to confirm the reduction and assess for any associated fractures.^{19,20} Clinicians should apply a bandage around the patient's head and mandible (ie, Barton bandage; [Figure 9](#)).^{5,19} A rigid cervical collar may also be used after reduction to provide support along the mandible. If reduction is unsuccessful after several attempts or frequently redislocates, an oral and maxillofacial specialist should be consulted. After reduction and bandage application, the clinician should provide several important instructions to the patient, listed in [Figure 10](#). These instructions can assist with symptom control after reduction and reduce the risk of recurrent dislocation.

- Avoid extreme mouth opening (> 2 cm) for 3 weeks.
- If yawning, support the lower jaw.
- Eat a soft diet for 1 week.
- Use nonsteroidal anti-inflammatory drugs to reduce pain and swelling.
- Place warm compresses on the temporomandibular area for 1 day.
- Follow-up with oral and maxillofacial surgery within 2 to 3 days.

Figure 10. Discharge instructions.

Patients should follow up with an oral and maxillofacial specialist within 2 to 3 days.⁵

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