

Marice B. Sangalang MD<sup>1</sup>  
Fatima M. Gansatao, MD<sup>1</sup>  
Alfred Peter Justine E. Dizon MD<sup>2</sup>  
Rubiliza DC. Onofre-Telan, MD<sup>1</sup>

<sup>1</sup>Department of Otolaryngology-Head and Neck Surgery  
'Amang' Rodriguez Memorial Medical Center

<sup>2</sup>Department of Surgery  
Angeles Medical Center, Pampanga, Philippines

## A New Extraoral Closed Reduction Technique for Temporomandibular Joint Dislocation: A Preliminary Case Series

### ABSTRACT

**Objective:** This study aims to describe a new extraoral technique for reducing bilateral temporomandibular joint (TMJ) dislocations.

**Methods:**

**Design:** Retrospective Preliminary Case Series  
**Setting:** Tertiary Government Training Hospital  
**Participants:** Ten (10) adults with bilateral TMJ dislocation

**Results:** Ten patients, 7 males and 3 females with median age of 35.50 (IQR:21.25 [23.50, 44.75]) years old were included in our series. Seven had more than one previous episode of TMJ dislocation, and the dislocation spontaneously occurred while yawning or eating in six patients. Our new technique resulted in complete bilateral reduction in three patients who had first-episode TMJ dislocations but only in four out of seven with previous dislocation. The three others (two partial, unilateral failure of reduction and one complete failure of reduction) needed conventional extraoral reduction (Hippocratic technique).

**Conclusion:** This new extraoral technique may show promising preliminary results in the management of temporomandibular joint dislocation, but a larger trial in comparison with other techniques is needed.

**Keywords:** *temporomandibular joint; TMJ; temporomandibular joint disorders; joint dislocations; therapy*

**Temporomandibular joint (TMJ)** dislocations have an incidence of 3% among all the possible dislocations occurring in the human body.<sup>1,2</sup> Dislocations can occur medially, laterally, posteriorly and anteriorly, and may be classified as partial (subluxation) or complete (luxation), bilateral or unilateral, acute, chronic protracted or chronic recurrent.<sup>3</sup> In the emergency department (ED) alone, the spontaneous type of anterior TMJ dislocation was reported to have annual incidence

Correspondence: Dr. Rubiliza DC. Onofre-Telan  
Department of Otolaryngology-Head and Neck Surgery  
'Amang' Rodriguez Memorial Medical Center  
Sto. Niño, Marikina City 1800  
Philippines  
Phone: (+63) 917 575 1982  
Email: rubiliza.onofre8211@gmail.com

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of 5.3 per 1,000,000 patients.<sup>1</sup> Associated discomfort due to limitation of joint mobility with impaired functions of speaking and chewing and resulting muscle spasm warrant the need for repositioning the joints.<sup>1,4</sup> However, due to instances of prolonged dislocation, extreme pain, stiffening of the jaw muscle and anxiety of patients, there are cases that needed sedation to facilitate reduction.<sup>4,5</sup>

Acute dislocations (isolated events presenting in 2 weeks which have no long-term sequelae when managed appropriately) can readily be reduced by intraoral approaches.<sup>2</sup> Two of the most common intraoral approaches, the Hippocratic- the conventional method and wrist pivot methods,<sup>6</sup> are comparable in terms of success rate, reduction-related pain, and reduction time.<sup>2</sup> However, disadvantages associated with these techniques include bite injuries which can lead to the possibility of the operator contracting hepatitis and HIV-AIDS thru open wounds.<sup>4,6</sup> On the other hand, the extraoral method as described by Chen *et al.*<sup>7</sup> remained to be difficult for both patients and physicians, attributed to the placement of direct pressure on the cheek bone and the coronoid process.<sup>4,7</sup> Moreover, extraoral techniques attain better resolution when applied to unilateral TMJ dislocations than to bilateral dislocations<sup>4,8</sup> and there were no significant differences between the time duration of performing the technique and failure rate compared to Hippocratic method.<sup>4</sup> Therefore, the difficulty of performing the current extraoral technique, and risk of bite injury to the operators associated with the intraoral techniques prompted us to develop an alternative extraoral technique that can possibly address these two issues related with current available techniques in the management of TMJ dislocations.

This study aims to describe our preliminary experience using a new extraoral technique for reducing bilateral temporomandibular joint dislocations.

## METHODS

With 'Amang' Rodriguez Memorial Medical Center Research Board approval (ARMMC-ERB R-2021-02-00), this retrospective case series reviewed records of patients aged 18-65 years old with acute anterior TMJ dislocation (less than 2 weeks) and no other associated temporomandibular joint disorders seen in our emergency department from July 1, 2020 to May 31, 2021. Excluded were those with incomplete data in the medical records and those who cases had mandibular dislocations with associated mandibular and facial fractures.

This new extraoral technique was conceived by co-investigator APJED (then a level 1 ORL-HNS resident in training at the East Avenue Medical Center) in 2014. He first performed it successfully on an emergency room patient with spontaneous TMJ dislocation who was agitated when an intraoral technique was initially attempted.

Seeing its potential, he started to apply the technique in reducing TMJ dislocations among awake patients throughout his residency training but did not write about it or publish any scientific article or technical note about it. Neither did we find this exact technique described as we searched through HERDIN Plus, MEDLINE (PubMed, PMC), EMBASE, Google Scholar, Directory of Open Access Journals (DOAJ), and Science Direct using the keywords "temporomandibular joint dislocation", "closed reduction", "TMJ", "temporomandibular joint disorders", "management", "treatment" and "therapy". In 2019, co-investigator FMG (who had performed the technique with APJED as a co-resident in the previous institution) joined our institution (ARMMC) and started teaching our residents the maneuver, applying it on patients who had TMJ dislocation. Together with the primary investigator (MBS), some modifications were made on the original technique, and with permission from the originator (APJED), the modified combined technique was called the DGS extraoral TMJ reduction technique (combining the letters of the last names of the three developers). This technique was employed by second year residents in training, assisted and supervised by a consultant, on all the patients with spontaneous bilateral anterior TMJ dislocation reported in this series. Decisions to proceed with performing Hippocratic method in cases of failed reduction using the developed technique were made after assessment and intervention by the supervising consultant.

### **Our extraoral TMJ reduction technique**

Patients were seated on a stool with their head resting on the physician's abdomen who was standing behind. (*Figure 1*) The physician's thumbs were positioned along the mandibular oblique line while the rest of the fingers were curled at the inferior mandibular border. (*Figure 2*) The patient was asked to slowly elevate and depress the mandible several times. During an active depression, the physician applied a sudden downward parallel force along the mandibular oblique line followed by an immediate reciprocal pull by the fingers on the inferior border of the mandible in a reverse "hockey stick" shaped direction. (*Figure 3*) Successful reduction was defined as complete reduction, evidenced by complete repositioning of both condylar heads into the glenoid fossa. Post-reduction measures included application of a Barton bandage, soft diet, and oral muscle relaxants and analgesics.

### **Data Analysis**

Records of patients meeting inclusion and exclusion criteria were collected, and the demographic profiles, previous history of TMJ dislocation, and outcomes of the reduction were extracted from the records and tabulated. An outcome was considered failed if

repositioning of both condylar heads into the glenoid fossa using the developed extraoral reduction technique was not achieved resulting to conversion to the Hippocratic TMJ reduction method. Descriptive statistics (median, IQR, frequencies and ratios) were utilized to describe the data. XLSTAT version 2021.3.1 (Addinsoft, NY, USA) was used for data analysis.



Figure 1. Positioning the patient with the physician standing behind.

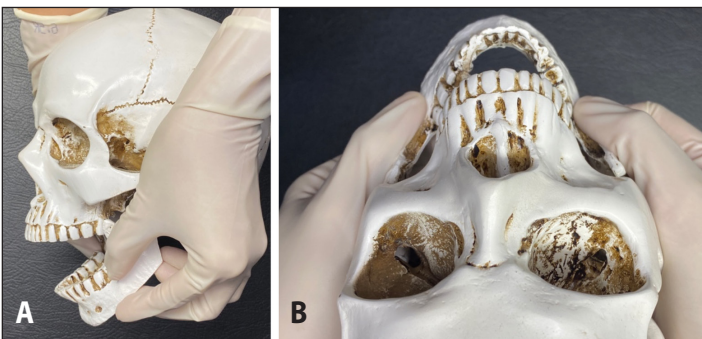


Figure 2. Model illustration of grasping the mandible along the mandibular oblique line. **A.** Lateral view; and **B.** Superior view.

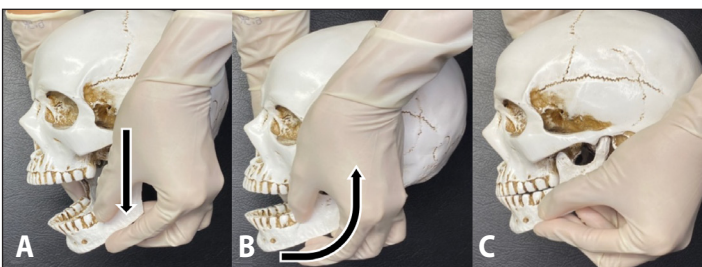


Figure 3. Model illustrations of **A.** Application of a sudden downward parallel force along the mandibular oblique line; **B.** Pulling on the inferior border of the mandible in a reverse "hockey stick" direction; and **C.** Completed reduction.

## RESULTS

Ten patients with bilateral anterior dislocations were included in our series, 7 males and 3 females, with median age of 35.50 (IQR:21.25 [23.50, 44.75]) years old. Seven out of 10 patients had experienced more than one previous episode of TMJ dislocations. One reported spontaneous reduction and resolution of dislocation with his previous episode while the others had their previous episodes reduced by doctors during ER visits. Six out of 10 disclosed that they were yawning prior to the event while 2 were eating before the dislocation happened. The interval between the occurrence of the dislocation to arrival of these patients at our emergency room for consult ranged from few minutes to 3 days.

Upon application of the new technique, resolution of the dislocation was attained among the three patients who came in with the first episode of bilateral dislocation. For the seven cases who had more than one previous dislocation, we were able to completely reduce the bilateral dislocation in 4 out of 7. For the three other patients out of these seven, we were not able to reduce either joint in one while we attained unilateral reduction in the other two. These three were eventually managed using the Hippocratic method. No fractures resulted among these 10 patients when performing the new technique.

## DISCUSSION

Our new extraoral closed reduction technique yielded a total of seven out of 10 successful reductions (three in first-episode, and four in repeat-episode dislocations), and three out of 10 failed reductions (one complete and two partial failures, all in repeat-episode dislocations).

In comparison, all seven patients who underwent the extraoral TMJ dislocation reduction technique of Chen *et al.* in 2007<sup>7</sup> (applying pressure over the cheek bones and coronoid process) attained full reduction. They further reported that other TMJ spontaneously reduced in cases where they were only able to initially reposition one of the joints in the fossa.<sup>7</sup> This differed from our experience as we did not encounter any such spontaneous reduction of the contralateral joint when only one joint was initially reduced.

Our series showed that our new technique may be useful in reducing bilateral dislocations, but we had three failures- two wherein we were only able to reduce one joint and one wherein we were not able to reduce both dislocations necessitating intraoral Hippocratic TMJ reduction. This finding showed a possible limitation of our extraoral approach in managing bilateral TMJ dislocations. A systematic review by Perchel *et al.* in 2018<sup>2</sup> reported that extraoral reduction techniques have low success rates when used for patients with bilateral dislocation. Similar observations were reported by Aredhali *et al.*<sup>8</sup> in their 2009



series where they employed the intraoral approach when they failed to reduce the other joint in two of their cases and they had to revert to the extraoral method developed by Chen *et al.*<sup>7</sup>

More importantly, all our three failures involved repeat-episode dislocations. Of the seven patients with a history of more than one episode of dislocation, we were only able to reduce four using our technique. This may suggest that the extraoral maneuver may be less effective when performed among patients with past histories of TMJ dislocations. The 2009<sup>8</sup> and 2016<sup>4</sup> studies of Ardehali *et al.* reported the ratio of recurrent dislocations to first encounter dislocations among their patients on whom the extraoral maneuver developed by Chen *et al.*<sup>7</sup> was performed but did not report the frequency of resolution in this subgroup of patients. In our present series, we may possibly attribute the difficulty or failure to attain bilateral reduction in three cases with previous dislocations to: 1) time from dislocation to intervention which was evident in one patient who came in with 3 days history of TMJ dislocation; 2) spasms of the pterygoid and masseteric muscles or laxity of the joint itself due to prior dislocations<sup>1</sup> where use of muscle relaxant or sedation could have help in the ease of reduction; and 3) patient and operator fatigue caused by repeated trials of the new procedure. Although no condylar fractures (common sequela of TMJ reduction)<sup>8,9</sup> resulted from our technique, it is premature to assume that our technique is safe to perform compared to intraoral and other extraoral techniques.

Our initial results may not demonstrate the maximum potential of this new technique, and our method still cannot be generalized to apply to all cases of bilateral TMJ dislocation. Limitations of this preliminary series include a small sample size and steep learning curve in mastering the technique. Performing the technique more often among patients who meet eligibility criteria and with guidance from its proponents to correct possible errors in performance and master the technique for those who will apply the maneuver may address this limitation. Further prospective studies involving more participants must be conducted to further assess its effectiveness and safety for these subsets of patients in comparison with the other intraoral and extraoral closed reduction techniques.

In conclusion, our new extraoral technique may show promising preliminary results in the management of bilateral temporomandibular joint dislocations, but a larger trial in comparison with other techniques is needed.

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