

Inferior Repositioning of Coronoid Process for the Treatment of Temporomandibular Joint Subluxation/Dislocation

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Abstract

Subluxation/dislocation of the temporomandibular joint (TMJ) is characterized by transient locking of the jaw following wide mouth opening. The etiology of the condition is multifactorial relating to hard-tissue or soft-tissue components of the joint. Myriad treatment procedures have been described in the literature, each with its own advantages and disadvantages. We present a new intraoral technique of coronoid repositioning for the treatment of TMJ subluxation/dislocation.

Keywords: Coronoid, temporalis, temporomandibular joint subluxation

INTRODUCTION

Dislocation/subluxation of temporomandibular joint (TMJ) is defined as a condition, in which the mandibular condyle escapes out of the glenoid fossa and assumes a position in front of the articular eminence.^[1] While subluxation is self-reducible, dislocation is not self-reducible. Dislocation is characterized by inability to close the mouth with acutely painful TMJ that requires immediate attention. The annual incidence of dislocation is approximately 25/100,000 population^[2] with female predilection.^[3] It is classified into various categories based on the frequency, chronicity, direction of displacement of condyle, and its relation to articular eminence. Management of this condition ranges from conservative or minimally invasive procedures to highly invasive surgeries. Conservative modalities are the application of Barton's bandage, intermaxillary fixation, and chin straps.^[2] These techniques are simple but not popular because they restrict mouth opening and do not permit normal jaw functions such as mastication and speech. The minimally invasive procedures include injection of sclerosants, dextrose, and autologous blood injections into the joint space. However, the results of these procedure are short lived and unpredictable.^[4] Surgical procedures are associated with morbidities. To circumvent the above-mentioned shortcomings, a simple intraoral technique is proposed to manage TMJ subluxation.

CASE REPORT

A 19-year-old female patient reported with a history of frequent episodes of difficulty in closing the mouth after wide mouth opening, for the past 6 months. This was associated with joint sounds which were bilateral. Characteristically, the patient experienced severe pain, 5–10 min after forceful closing of mouth. During every episode, the pain originated on the right side of the TMJ and lasted for 2 h. The nature of the pain was dull and aching and radiating to the right side ear, forehead, neck, and shoulder. The pain was aggravated by excessive jaw movements and relieved by rest and nonsteroidal anti-inflammatory drugs.

The patient's medical history did not reveal anything relevant to the clinical symptoms such as trauma to the joint, medication, or parafunctional habits.

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Extraoral clinical examination revealed the following: the maximal mouth opening was 52 mm with a deviation of the mandible toward the left side. Bilateral preauricular hollowing was noted on wide opening. On palpation, mild tenderness was appreciated on the right side of TMJ along with clicking during the late opening and early closing of the mouth. Intraoral examination revealed Class 1 occlusion and the maxillary dental midline coinciding with the mandibular dental midline. Based on the clinical features, a provisional diagnosis of subluxation of the joint was made.

Orthopantomogram (OPG) was taken in two views with the mouth open and closed: closed mouth view demonstrated a slender and small condyle with shallow articular eminence on both sides of the TMJ and open mouth view showed bilateral dislocation of condyle anterior to the eminence [Figure 1]. Assessment of cone-beam computed tomography (CT) demonstrated the length of condyle on the right and left as 16.1 mm and 18.5 mm, respectively. The mediolateral width of the right condyle was 12.5 mm and the left condyle was 13.4 mm. The vertical dimensions of the articular eminence on the right and left side were 29.4 mm and 22.9 mm, respectively. Based on all the above investigations, a definitive diagnosis of bilateral subluxation of TMJ was made and planned for surgical management.



Figure 1: Preoperative orthopantomograph showing bilateral dislocation of the condyle



Figure 3: Postoperative computed tomography after fixation

Surgical technique: Inferior repositioning of right coronoid under general anesthesia

Under general anesthesia, vestibular incision was placed extending from the 2nd molar till the ascending ramus of the mandible. The ramus and coronoid were exposed after dissection of soft tissues. Osteotomy cut was marked using the following reference points: Point A was marked on the ramus of the mandible from the lower occlusal plane and Point B was marked 16 mm above the first point which was planned preoperatively using stereolithography model [Figure 2]. Osteotomy cut was made from the Point B to the base of the sigmoid notch. The osteotomy of coronoid was completed using a mallet and chisel. A trough was created on the lateral surface of the ramus to position the osteotomized coronoid. The coronoid was positioned inferiorly in the trough and was fixed with a 2-holed, 2-mm plate using 6-mm screws through the transbuccal approach. The surgical wound was closed with 3-0 vicryl in layers. Extraoral stab incision was also sutured with 3-0 vicryl suture. The mouth opening of the patient on the 1st postoperative period was 25 mm. Postoperatively, the length and thickness of the right temporalis and lateral pterygoid on both sides were assessed using ultrasonography which revealed appreciable increase in both the dimensions [Table 1]. Postoperatively, the position of coronoid was confirmed with OPG and three-dimensional CT [Figures 3 and 4].

The patient was followed up for 6 months, during which the patient’s mouth opening was 40 mm consistently, with



Figure 2: Stereolithography model depicting inferiorly repositioned coronoid

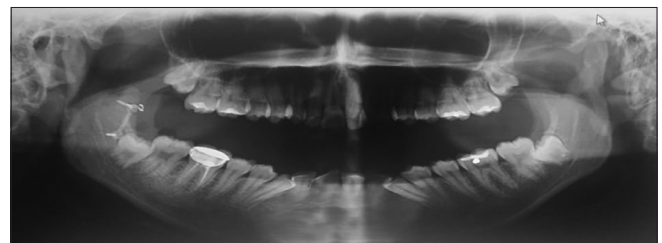


Figure 4: Postoperative orthopantomograph after fixation

Table 1: Evaluation of muscles using ultrasonography

	Preoperative (mm)	Postoperative 1 st week (mm)	Postoperative 4 th week (mm)
Length of temporalis muscle			
Temporalis at rest	64	67.7	67.7
Temporalis on clenching	50	No obvious change seen	No obvious change seen
Thickness of temporalis muscle			
Temporalis at rest	10.8	13.7	11.0
Temporalis on clenching	11.4	No obvious change seen	13.3

no incidence of open lock, TMJ pain, or difficulty in jaw movements.

DISCUSSION

The treatment options for dislocation as advocated by Miller and Murphy encompass a wide range of surgical procedures which are aimed at the soft- as well as hard-tissue components of the TMJ:^[1] (1) capsular tightening procedures, (2) creation of mechanical obstacle, (3) removal of mechanical obstacle, (4) direct restraint of the condyle, and (5) creating a new muscular balance.

Soft-tissue procedures such as injection of sclerosing agents, botulin toxin, dextrose, and capsulorrhaphy are short lived and unpredictable.^[1] Definitive treatment of dislocation revolves around either creating a mechanical obstacle or removal of mechanical obstacle.^[1] However, most of these techniques are associated with limitations; glenotemporal osteotomy^[1] (GTO) and Dautery's technique^[1] are extensive procedures. The other disadvantages are placement of extraoral incisions resulting in a scar and risk of injury to facial nerve. Segami^[5] proposed a modified preauricular approach under local anesthesia which also demonstrated facial palsy in 22% of patients.^[5] GTO requires graft which is associated with donor-site morbidity and violates the TMJ architecture.^[5] Modified Leclerc^[6] and Wolford's procedures require use of hardwares such as miniplate and screws which are prone for infection and loosening.

Rationale behind author's technique

Stretch increases neuromuscular activity and resistance training which result in hypertrophy and increase in mitochondrial content as well as cross-sectional area of the fibers. Our study demonstrated the same, with ultrasonography. On the operated side, there was an increase in the thickness and length of the temporalis muscle which translated into better contraction. Literature also reveals a shift in the type of muscle fiber to a larger percentage of slow-type fibers.^[7] Further, Grünheid *et al.*^[7] demonstrated increase in slower Type IIA and IIX fibers in masseter, temporalis, and digastric muscles within a few weeks of mandibular advancement in rats.

Temporalis scarification is also one of the options to treat dislocation in which a portion of the muscle fibers are severed and shortened that result in limited mouth opening. However, the procedure is unpredictable and may lead to excessive restriction of mouth opening. However, our technique aimed at stretching the temporalis muscle resulted in better muscle function without excessive restriction of mouth opening.

Advantages of the author's technique

The advantages include simplicity of the technique and no requirement for an extraoral incision that would result in scarring. The procedure neither affects the facial nerve nor violates the joint structures.

CONCLUSION

Inferior repositioning of the coronoid is an effective technique to address subluxation/recurrent dislocation. It is intraoral in approach, easy to perform, and does not pose any risk to the facial nerve. A study comprising a large sample with adequate follow-up period is required to assess the long-term results of this technique.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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