

# A Clinical Study on Treatment of Temporomandibular Joint Chronic Recurrent Dislocations by a Modified Eminoplasty Technique

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Various augmentation techniques have been proposed to incarcerate the condyle for the treatment of temporomandibular joint chronic recurrent dislocation (CRD). Some of them have been used successfully, whereas some of them failed. The purpose of this study was to present an alternative eminoplasty technique, more specifically an inlay augmentation technique of articular eminence in the treatment of temporomandibular joint CRD. Twelve patients, 11 of whom had bilateral and the remaining 1 of whom had unilateral CRD, were evaluated. The same technique was used in the treatment of all patients. An oblique osteotomy of the eminence was carried out. Harvested chin graft was contoured in wedge form and inserted tightly into the osteotomy site. The augmentation of the eminence was provided by an inlay cortical bone graft without using any of the conventional fixation materials used to secure the bone graft. All of the symptoms of CRD have disappeared in the postoperative stage. Long-term follow-up revealed satisfactory mouth opening and augmentation of the eminence. None of the fixation materials such as wire, screw, or miniplate were used to keep the bone graft in proper place, and yet, patients had no further episode. It provided shorter operating time for surgeon and satisfactory postoperative results.

**Key Words:** Arthroplasty, bone graft, dislocations, eminoplasty, inlay augmentation, recurrent dislocations, TMJ, TMJ chronic dislocations

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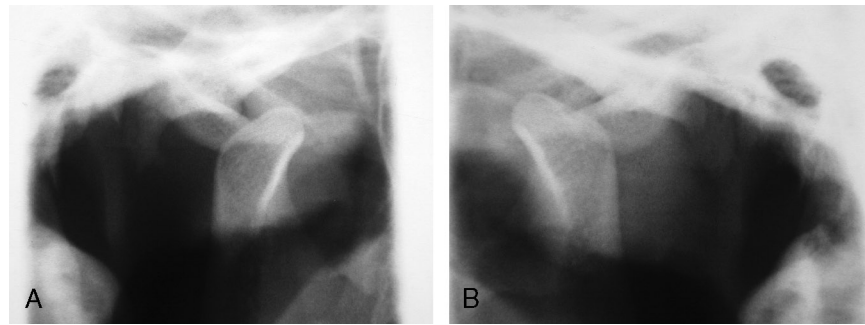
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**C**hronic recurrent dislocation (CRD) of temporomandibular joint (TMJ) is a rare incidence, and there can be anatomic predisposition to dislocation. The triad of ligamentous and capsular flaccidity eminent erosion, flattening, and trauma is well recognized in genesis of CRD. In such predisposed individuals, yawning, vomiting, extremes of masticatory effort, or laughing may precipitate eluxation.<sup>1,2</sup> Dislocations due to sagittal split osteotomy<sup>3</sup> and mandibular symphyseal distraction<sup>2,4</sup> have also been reported.

A review of the literature over the period from 1884 to date shows great and increasing ingenuity in surgical treatment of CRD, but it still remains a challenge. Many techniques have been proposed for the treatment of CRD, including extra-articular sclerosing agent,<sup>5,6</sup> partial or complete myotomy,<sup>7</sup> capsular placcation,<sup>8</sup> open condylotomy,<sup>9</sup> down-fracturing of the zygomatic arches, and eminectomy.<sup>10-18</sup> Of the myriad procedures currently used by maxillofacial surgeons, eminoplasty by augmentation of the eminence<sup>19-22</sup> is, in all probability, the most popular and commonly preferred. Many of the augmentation techniques and variable success rates have been reported so far. Some materials were used by surgeons to augment an eminence and to incarcerate the condyle; some of them used the materials successfully, and some of them failed.<sup>19-23</sup> Autogenic and preferably cancellous bone graft provided from ilium has been the most popular augmentation material, and wire osteosynthesis has been the most conventional technique for stabilization of the graft material.<sup>1,21,22</sup> The aim of this paper was to present an alternative augmentation technique of the articular eminence in treatment of TMJ CRD.

## PATIENTS AND METHODS

**E**leven female patients (of the total 12) underwent bilateral and 1 patient underwent unilateral arthroplasty for CRD. Age at the time of surgery



**Fig 1** A, B, Preoperative x-rays reveal anterior dislocation of the condyles when mouth was open (patient no. 10).

ranged from 22 to 34 years (mean = 26.1 years). The first episode had been encountered within 1 to 7 years (mean = 3 years) before surgical treatment (Fig 1). Tooth removal and traffic accidents were the predominant etiologic factors. The most common triggering causes for dislocations were yawning, laughing, and eating. After having the first episodes, their condyles were replaced by Hippocratic method without local anesthetics (12 patients). Later, 9 of these patients had an experience of replacement by Hippocratic method with local anesthetics, patients had general anesthesia for replacement, and 3 of them needed intermaxillary fixation for a while after replacement of the condyles (Table 1).

Patients had no history of grand mal epilepsy, they had no previous surgical operation for the treatment of CRD, and they were not patients with longstanding dislocation.

**Surgical Technique**

Under nasotracheal general anesthesia, bilateral emi-noplasty was performed. The TMJ was approached through an endaural incision with extension toward

the temporal area to permit anterior mobilization of the tissue and exposure of the articular eminence without damaging the facial nerve. The dissection proceeded to the zygomatic arch and extended anteriorly and posteriorly to expose the TMJ area. The periosteum covering the zygomatic arch was incised and elevated. Upper and anterior attachments of the capsule were gently detached to expose the eminence from lateral to medial thoroughly. An oblique osteotomy of the eminence was carried out, and the cut was extended medially to increase the height of the medial articular part of the eminence (Figs 2A, B).

Chin graft consisting in homogenous compact bone was preferred for augmentation in this study. Approximately 8- to 10-mm-diameter chin graft, including mostly cortical bone, was harvested by Dowel cutter. Cylindrical Dowel graft was trimmed and contoured in wedge form (Fig 3). Wedge-formed bone graft was gently tapped and inserted tightly into the osteotomy site. A green-stick fracture was created, avoiding a possible total fracture of the lower segment of the eminence (Figs 4A, B). Then augmentation of the eminence was completed by an inlay bone

**Table 1.** Causes of the CRD and Treatments

No.	Age	Sex	Etiology	Joint Involved	First Episode, y	Previous Treatments	Episodes, per month	Follow-up period, y
1	25	F	?	Bilateral	1	RLA	3	4
2	30	F	Dental extraction	Unilateral	6	RLA+RWLA+RGA	6-8	3
3	29	F	?	Bilatera	3	RLA+RWLA	4	5
4	28	F	Fall	Bilateral	2	RLA	2	4
5	27	F	Dental extraction	Bilateral	3	RLA+RWLA+IMF	4-6	5
6	24	F	?	Bilateral	4	RLA+RWLA+IMF	4	6
7	27	F	Traffic acc.	Bilateral	2	RLA	3-4	2
8	34	F	Traffic acc.	Bilateral	3	RLA+RWLA	3-4	5
9	22	F	Fall	Bilateral	2	RLA+RWLA	4-6	4
10	24	F	Dental extraction	Bilatera	7	RLA+RWLA+RGA+IMF	15-20	3
11	31	F	Traffic acc.	Bilatera	2	RLA+RWLA	4-6	6
12	22	F	Dental extraction	Bilateral	2	RLA+RWLA	3-4	4

IMF, intermaxillary fixation; RGA, replacement under general anesthesia; RLA, replacement without local anesthetics; RWLA, replacement with local anesthetics.

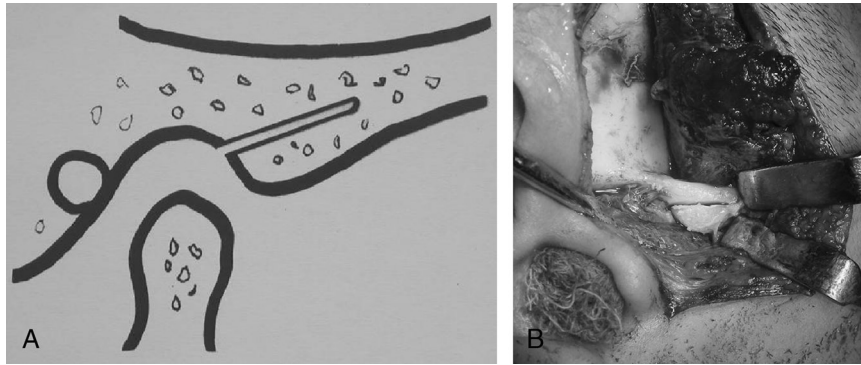


Fig 2 A, B, Oblique osteotomy of the eminence was carried out.

graft. With this approach, no fixation material such as wire, screws, or plates were needed. In addition, the surgical procedure was performed without damaging the capsule and intra-articular structures.

In postoperative stage, intermaxillary fixation was applied for 1 week to prevent any damage of the inlay graft. At the end of 1 week, soft diet and self-guided mouth-opening exercises were advised as tolerated for 5 weeks.

**RESULTS**

Symptoms have disappeared in the postoperative period; patients were able to open their mouth without any fear of dislocation. Figures 5 A, B, and C reveal mouth opening of patient no. 10 after 3 months from operation. Postoperative radiographs demonstrated the success of the bone grafting. After 3 years, computed tomography and x-ray images reveal satisfactory augmentation of the articular eminence and anterior movement of the condyles of the same patient (Fig 6).

Table 1 reveals the relevant detailed data of patients. The postoperative follow-up period ranged from 2 to 6 years (mean = 4.2 years).

**DISCUSSION**

The term *chronic, chronic recurrent, or habitual* should be reserved for repeated episodic dislocation.<sup>1</sup> Various forms of dislocations have been reported, including anterosuperior,<sup>24</sup> medial, and lateral.<sup>25</sup> Posterior dislocation is extremely rare. Caput protrusio glenoidalis—with the condyle lying within the middle cranial fossa—is also rare and was first described in 1884 by Heath<sup>25</sup> and later by Gunning<sup>26</sup> and the others.<sup>27-31</sup>

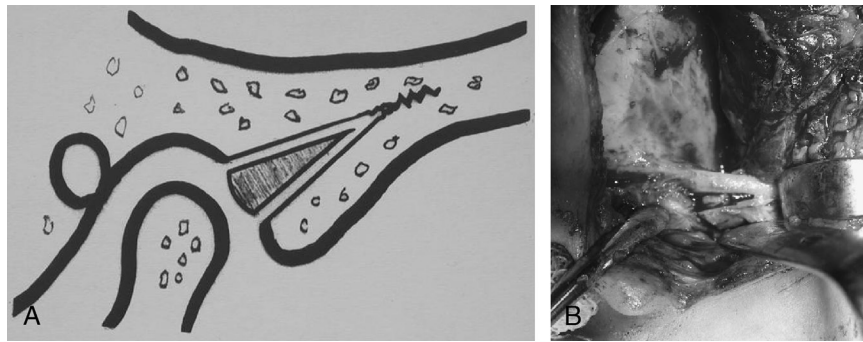
The pathogenesis of CRD has been attributed to trauma and abnormal chewing movements. It is found

more frequently in people with general joint laxity and in patients with internal derangement of the TMJ or occlusal disturbance.<sup>32</sup>

A variety of techniques have been advocated for the treatment of CRD. Conservative approaches have been proposed to limit the excursion of the condyle, including physiotherapy,<sup>22</sup> splints, and even sclerosing injections<sup>5</sup> in an attempt to cause joint fibrosis. In the surgical treatment of CRD, several techniques have been popular and commonly preferred by surgeons. Some of the authors concluded that emino-plasty with down-fracturing of the zygomatic arch and bone grafting may be the predictable treatment for CRD.<sup>8,18-20,33,34</sup> However, this operation may fail in some circumstances as a consequence of either case selection or operative technique. Norman and Bramley<sup>1</sup> commented earlier upon the phenomenon of medial escape and apparent inability of a narrow zygomatic arch to incarcerate the condyle and, in particular, a small condyle. If the operation of zygomatic down-fracture fails to incarcerate the condyle,



Fig 3 Cylindrical Dowel graft provided from chin was trimmed and contoured in wedge form.



**Fig 4** A, B, Wedge formed bone graft was gently tapped and placed tightly into the osteotomy site.

a revision arthroplasty will clearly be needed to reclaim the situation. To produce a barrier by zygomatic down-fracture and an autograft to incarcerate the condyle may be a logical alternative when compared with the techniques creating a barrier with variety of alloplastic materials. Shibata et al<sup>35</sup> and Cardoso et al<sup>36</sup> placed miniplate to incarcerate the condyle, but their long-term results were never reported. The long-term consequences of the relation of the cartilage and osseous components of the condyle and a fixed titanium plate during function have to be explained in this kind of treatments. The possibility of the degenerative changes in fibrocartilage always exists. In the following years, Güven<sup>23</sup> reported the unfortunate consequences of the metallic barriers in treatment of CRD.

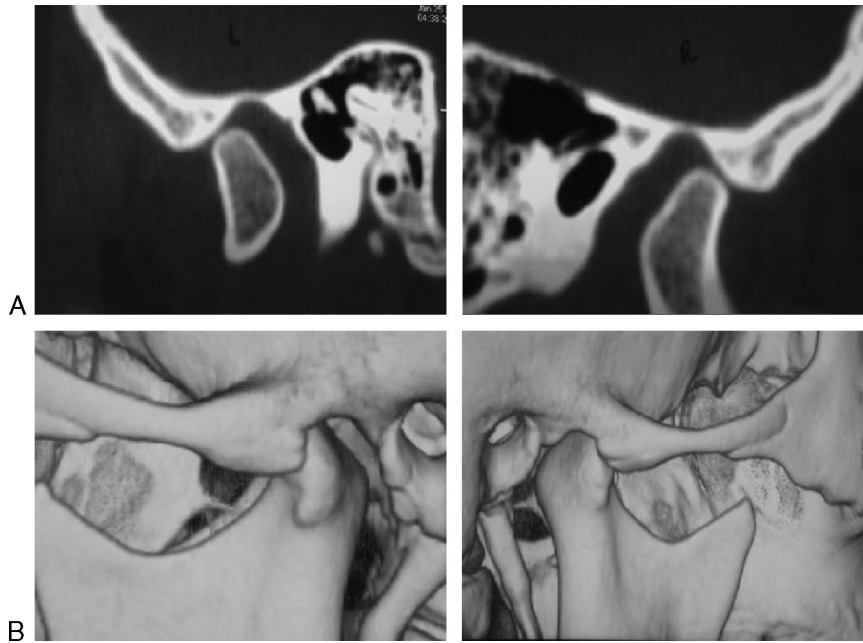
Eminectomy is an acceptable alternative in the treatment of the patients with CRD who have damage on their eminences. On the other hand, for the CRD patients who need surgical treatment for the first

time, eminoplasty is the best choice. After eminectomy, it is difficult to recreate a satisfactory eminentia.

An angular reshaping or planning of the eminence has been termed *eminoplasty*.<sup>1,37,38</sup> A variety of techniques and materials have been suggested for the augmentation of the eminence. Schade<sup>6</sup> recommended osteotomy with insertion of silastic wedge. The technique of rebuilding the articular eminence with polymethyl-methacrylate after carrying out an osteotomy was described as an alternative for the treatment of CRD.<sup>1</sup> Compared with the allografts, autogenic bone grafts have been considered as a better choice in treatments of many disorders in maxillofacial surgery. Norman and Bramley<sup>1</sup> reported successful results with eminoplasty made by autogenic bone grafts. After an oblique osteotomy of the eminence, bone block is down-fractured, and bone graft provided from ilium was inserted between the 2 segments and firmly anchored by a compression wire osteosynthesis. Just in case the anterior limb of osteotomy



**Fig 5** A, Preoperative clinical examination revealed that the mouth was wide open, and mandibular movement was restricted (patient no. 10). Patient's general condition was poor due to the recurrent episodes during last week. B, C, At the patient's postoperative 3 months control, her general condition was better, and she had pain-free and painless and fearless mouth opening.



**Fig 6** A1, A2, Postoperative 3-year computed tomography images reveal satisfactory anterior excursions of the condyles (above). B1, B2, 3-dimensional computed tomography images show complete healing of the augmented eminencia.

site fractures, a dual-wire osteosynthesis is required. Failure to achieve adequate width of the graft may allow medial escape of mandibular condyle and further episodes of dislocation. In the technique described in this article, after an oblique osteotomy of the eminence (Figs 2A, B), wedge-formed cortical bone graft (Fig 3) was gently tapped and inserted tightly into the osteotomy site (Figs 4A, B). A green-stick fracture was created, avoiding a possible total fracture of the lower segment (bone block) of the eminence. None of the fixation material such as wire, screw, or miniplate was used to keep the bone graft in proper place. Intermaxillary fixation was applied for 1 week to prevent any possible damage of the augmented eminencia. Intermaxillary fixation for a short period and soft diet in the following days were enough to have a satisfactory rehabilitation of the articular eminence. Patients had no further episode. It is possible to create a bigger barrier by placing a big bony block and using wires or screws to secure it. In treatment of CRD with arthroplasty, the purpose is not to completely incarcerate the condyle and create disability in jaw movements. The purpose of the treatment of CRD is to prevent recurrent episodes of dislocation and to provide free excursions of the mandible without a fear of dislocation as the patient had before. For this reason, carefully placed, reasonable amount of cortical bone graft without using fixation material with the technique described in

this paper will provide satisfactory mouth opening and movements of the mandible and a better life standard for the patients with CRD. After all, placing the bone graft between the green-stick type fractured segments without using any fixation materials provided shorter operating time for surgeon and the same postoperative result as the technique described by Norman and Bramley.<sup>1</sup>

Quality and the type of the bone graft are another matter to be discussed. In contrast to the previously reported studies,<sup>1,21,22</sup> chin graft was preferred in this study instead of the iliac graft, which consists of mostly spongy bone material. Chin graft consisting in homogenous compact bone provided a better and satisfactory augmentation and prevented an undesirable resorption of articular eminence during remodeling under functional forces in the long term.

The youngest patient was 22 years old at the time of surgery, and the oldest was to 34 years old (mean = 26.1 years) in this study. Age distribution revealed that the patients treated by this technique were not old. After all, they had no history of grand mal epilepsy, they had no previous surgical operation for the treatment of CRD, and they were not patients with long-standing dislocation as described by Norman and Bramley.<sup>1</sup> For this reason, a modified eminoplasty technique with inlay augmentation was preferred in the treatment of the patients in this study. In old patients with long-standing dislocations

and/or with epilepsy and in the patients who were surgically treated previously, the other techniques that will not limit the movement of the condyls may serve better for the treatment.

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