

Treatment of Chronic Mandibular Dislocations: A Comparison Between Eminectomy and Miniplates

Belmiro Cavalcanti do Egito Vasconcelos, DDS, PhD,* and
Gabriela Granja Porto, DDS, MSc†

Purpose: Temporomandibular joint dislocation is defined as an excessive forward movement of the condyle beyond the articular eminence with complete separation of the articular surfaces and fixation in that position. The purpose of this study was to compare 2 types of treatment for chronic mandibular dislocations, eminectomy and miniplates, evaluate the results of these surgeries, and make a critical review of the literature.

Patients and Methods: The sample was obtained from the records of Oswaldo Cruz Hospital (Recife, Brazil) and comprised cases submitted to chronic mandibular dislocation treatment by eminectomy and by use of miniplates between 2000 and 2006. Preoperative and postoperative assessment included a thorough history and physical examination to determine the maximal mouth opening, presence of pain and sounds, frequency of dislocations, recurrence rate, and presence of facial nerve paralysis.

Results: After eminectomy, the mean maximal mouth opening was 48.4 ± 8.5 mm preoperatively and 41.3 ± 5.0 mm postoperatively. After the use of miniplates, it was 42.75 ± 11.53 and 45.62 ± 8.52 mm, respectively. There was no facial nerve paralysis after either treatment. Recurrence occurred with miniplates (11.11%) but not with eminectomy.

Conclusion: Eminectomy had less chance of recurrence without creating articular damage, and with miniplates, the chance of recurrence increased because there is always the possibility of the miniplate fracturing.

© 2009 American Association of Oral and Maxillofacial Surgeons
J Oral Maxillofac Surg 67:2599-2604, 2009

Temporomandibular joint (TMJ) dislocation is defined as an excessive forward movement of the condyle beyond the articular eminence with complete separation of the articular surfaces and fixation in that position.^{1,2} It is commonly associated with poor development of the articular fossa, laxity of the temporomandibular liga-

ment or joint capsule, and excessive activity of the lateral pterygoid and infrahyoid muscles due to drug use or disease.^{1,2}

A variety of therapeutic approaches designed to limit the forward excursion of the condylar head have been applied, such as intracapsular injection of sclerosing solutions,³ intramuscular injection of botulinum toxin type A,⁴ lateral pterygoid myotomy,⁵ scarification of the temporalis tendon,⁶ and bone grafting augmentation or application of a well-designed alloplastic impediment with vitallium mesh or titanium plates.^{3,7} Another type of treatment is reduction of the eminence, thereby permitting free movement of the condyle.⁷ Each form of treatment has its own advantages and disadvantages.

The aim of this study is to compare 2 techniques used for the treatment of chronic mandibular dislocation: eminectomy and miniplates. A descriptive statistical analysis is also presented, as well as a critical review of the literature stating and discussing the advantages and disadvantages of each type of treatment.

Received from the University of Pernambuco, Recife, Brazil.

*Senior Lecturer, Department of Oral and Maxillofacial Surgery, and Director, Master's and PhD Programs in Oral and Maxillofacial Surgery.

†Postgraduate Student, PhD Program in Oral and Maxillofacial Surgery.

Address correspondence and reprint requests to Dr Vasconcelos: Faculdade de Odontologia de Pernambuco, Departamento de Cirurgia e Traumatologia BMF, Av General Newton Cavalcanti, 1650 Camaragibe PE, Brazil; e-mail: belmiro@pesquisador.cnpq.br

© 2009 American Association of Oral and Maxillofacial Surgeons

0278-2391/09/6712-0008\$36.00/0

doi:10.1016/j.joms.2009.04.113

Patients and Methods

A retrospective evaluation of 10 patients treated by eminectomy and 8 treated by use of miniplates with chronic mandibular dislocations was conducted at the Division of Oral and Maxillofacial Surgery, Oswaldo Cruz Hospital–University of Pernambuco, Recife, Brazil, between 2000 and 2006.

The following criteria were used for inclusion in the study: at least 5 episodes of dislocation per month; inability to perform jaw movements to smile, speak, or eat; and failure of conservative treatment methods, such as orientation to self-limit jaw movements and the use of a chin cup.

Radiographic examination included panoramic radiographs and conventional tomography to determine the height of the articular eminence. Preoperative assessment included a thorough history and physical examination to determine the maximal mouth opening (MMO) and frequency of dislocations; in addition, the patient's age and gender were recorded. The patients were preoperatively and postoperatively examined and classified according to the grading system of House and Brackmann⁸ to detect any signs of facial nerve paralysis or paresthesia. The period of recovery from any paralysis was also observed.

Magnetic resonance imaging was used to determine whether 3 patients treated by eminectomy, with the longest follow-up, had articular damage.

SURGICAL PROCEDURES FOR EMINECTOMY

Exposure of the TMJ was done by the preauricular approach described by Ellis and Zide⁹ with the patient under general anesthesia. After exposure and identification of the articular eminence, it was removed with a No. 703 drill. The jaw movements were then checked for interference and any required adjustments made (Fig 1).

SURGICAL PROCEDURES FOR MINIPLATES

The same exposure of the TMJ was done for the placement of miniplates. After exposure and identification of the articular eminence, an L-shaped 2.0-mm miniplate was used, where the short arm of the plate was fixed with two 6-mm screws and the long arm served as a mechanical obstacle in the condylar path placed inferior and anterior to the articular eminence. The jaw movements were then checked for interference and any required adjustments made (Fig 2).

Results

EMINECTOMY

The data of the patients treated by eminectomy, including age, gender, MMO, presence of preoperative and postoperative pain and sounds, length of follow-up, and frequency of dislocations are shown in Table 1.

The mean age of the patients in this group was 31.4 years (range, 22-52 years). The mean duration of postoperative follow-up was 37.4 months (range, 2-63 months). There were a total of 20 eminectomies for the treatment of chronic mandibular dislocation in 10 patients.

The mean preoperative and postoperative MMO was 48.4 ± 8.5 mm and 41.3 ± 5.0 mm, respectively.

There were sounds in the TMJ in 4 patients preoperatively, and 2 continued to have this sign after surgery. In 1 patient with no preoperative sounds, crepitation was observed postoperatively.

Of the 4 patients who reported pain preoperatively, only 1 continued to have this symptom. One patient who did not report pain preoperatively felt some pain in the postoperative period.

The magnetic resonance images in 3 patients treated by eminectomy showed that there was no articular damage in any of them (Fig 3).

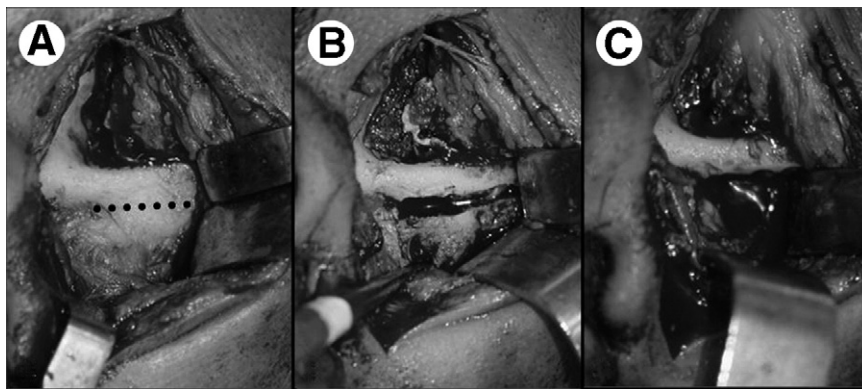


FIGURE 1. Surgical procedure for eminectomy. A, Identification of articular eminence. B, C, Removal of articular eminence with a No. 703 drill.

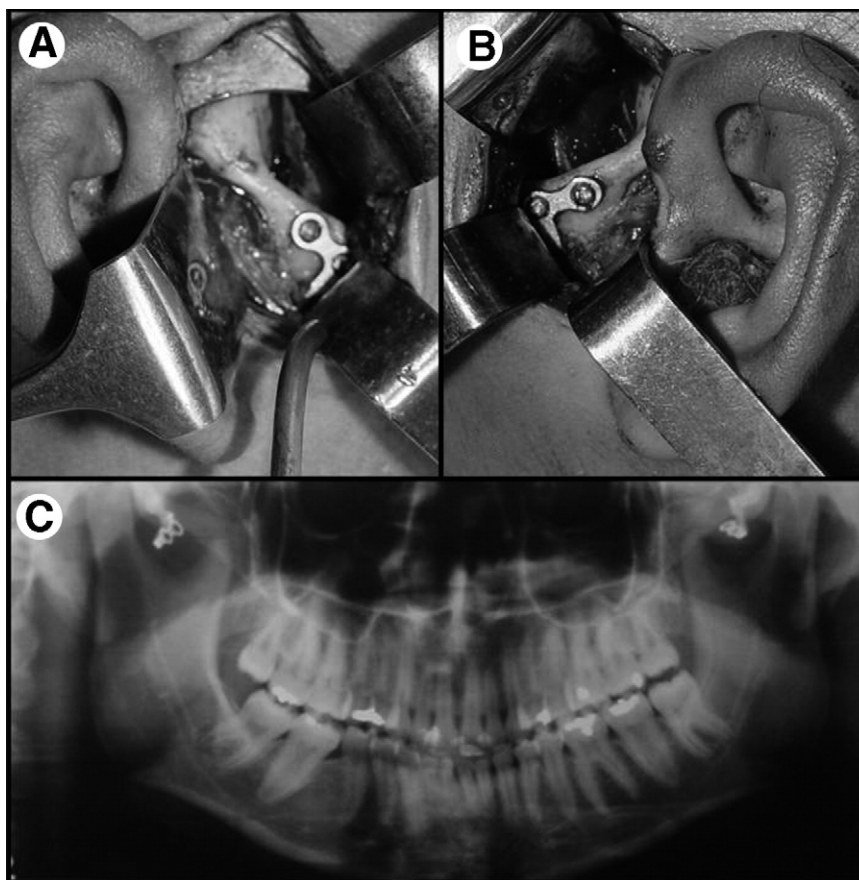


FIGURE 2. Surgical procedure for miniplates. A, Placement of an L-shaped 2.0-mm miniplate on right side. B, Placement of miniplate on left side. C, Panoramic radiograph showing placement of miniplate inferior and anterior to articular eminence.

Vasconcelos and Porto. Chronic Mandibular Dislocation. J Oral Maxillofac Surg 2009.

No nerve paralysis or recurrence of mandibular dislocation was observed in any patient.

MINIPLATES

The data of the patients treated by use of miniplates, including age, gender, preoperative and

postoperative MMO, follow-up and facial nerve injury, are shown in **Table 2**.

The mean age of the patients in this group was 29.3 years (range, 22-42 years). The mean duration of postoperative follow-up was 59.75 months (range, 48-69 months). There were a total of 16 placements of

Table 1. DATA OF PATIENTS TREATED BY EMINECTOMY

Patient No.	Gender	Age (yr)	MMO (mm)		Pain		Sound		Follow-Up (mo)	Dislocation Frequency (mo)
			Preop	Postop	Preop	Postop	Preop	Postop		
1	M	24	53	46	N	N	N	N	63	2
2	F	24	52	47	Y	N	N	N	62	40
3	M	40	47	45	N	N	N	Y	62	3
4	M	27	55	45	N	N	Y	N	61	3
5	F	24	51	44	N	Y	N	N	53	28
6	F	22	50	41	Y	N	Y	Y	38	14
7	F	52	61	32	N	N	Y	N	17	21
8	F	29	30	36	N	N	N	N	5	21
9	F	27	43	40	Y	N	N	N	10	7
10	F	45	42	37	Y	Y	Y	Y	3	1

Abbreviations: Preop, preoperatively; Post, postoperatively.

Vasconcelos and Porto. Chronic Mandibular Dislocation. J Oral Maxillofac Surg 2009.

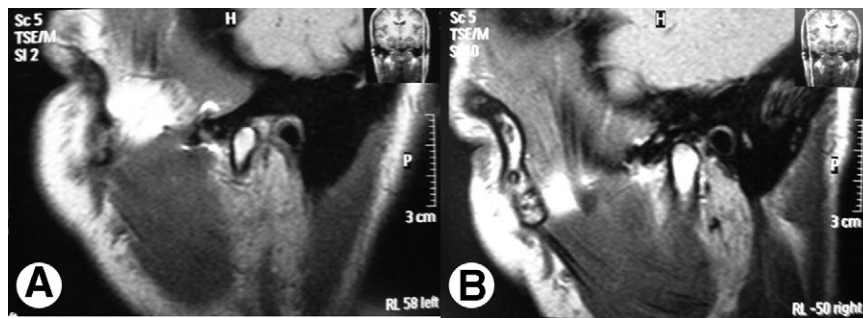


FIGURE 3. Magnetic resonance images showing placement of articular disc on left side (A) and on right side (B).

Vasconcelos and Porto. *Chronic Mandibular Dislocation. J Oral Maxillofac Surg* 2009.

miniplates for the treatment of chronic mandibular dislocation in 8 patients.

The mean preoperative and postoperative MMO was 42.75 ± 11.53 mm and 45.62 ± 8.52 mm, respectively.

The major complication found was unilateral miniplate fracture in 2 patients (Fig 2). In one of these patients there was recurrence of the mandibular dislocation. Both patients were treated by removal of the bilateral miniplates and bilateral eminectomy, and at present, they have shown no recurrence. No nerve paralysis was observed in any patient.

Comparisons of both treatments are shown in Tables 3 and 4.

Discussion

Surgery is often appropriate when dislocation is prolonged or recurrent.¹⁰ Numerous surgical procedures for habitual dislocation have been described in the literature based on the creation of a mechanical obstacle in the condylar path, such as positioning the disc anterior to the condyle, downfracturing of the zygomatic arch and fixation medial to the eminence, or insertion of implants into the eminence.^{10,11} In

addition, there are other modes of treatment that aim to restrict movement of the condyle such as the injection of sclerosing substances or even the induction of fibrosis in the tissues adjacent to the joint.^{11,12} Another type of treatment is removal of the mechanical obstacles in the condylar path; one such procedure is eminectomy, which was introduced by Myrhaug in 1951^{1,10} and has been used with satisfactory results and efficacy according to the literature.¹³⁻¹⁵

Each form of treatment has its own advantages and disadvantages. The placement of a titanium miniplate in the articular eminence aims to prevent hyperexcursion of the condyle, thereby avoiding its displacement. It has the advantage of being a reversible and less invasive method, but it has the disadvantage of leading to a decrease in MMO,^{11,12} which was seen in only 4 patients (50%) of our series (Table 2). The other 2 who had an increase in mouth opening had also the plate fracture. The possibility of plate fracturing is another disadvantage, requiring a further operation for removal of the device and choice of a new treatment, which occurred in 2 cases in our series. According to the results of this study, we suggest that plate fracturing could be explained by material fa-

Table 2. DATA OF PATIENTS TREATED WITH MINIPLATES

Patient No.	Gender	Age (yr)	MMO (mm)		Complications	Follow-Up (mo)	Facial Nerve Paralysis
			Preop	Postop			
1	M	30	39	35	None	67	N
2	F	42	24	45	None	67	N
3	F	22	57	41	None	48	N
4	M	40	40	37	None	69	N
5	F	26	40	52	None	67	N
6	F	24	34	50	Recurrence and plate fracture on right side	48	N
7	F	32	57	61	Plate fracture on right side	61	N
8	F	24	51	44	None	51	N

Abbreviations: Preop, preoperatively; Post, postoperatively.

Vasconcelos and Porto. *Chronic Mandibular Dislocation. J Oral Maxillofac Surg* 2009.

tigue, where the plate was bent during the adaptation to the articular eminence during surgery. Therefore the plate is not proper for the treatment of condylar dislocation, which is in agreement with the findings of Kuttenger and Hardt.¹¹

The way of placing the miniplate may influence the final result. As described by Buckley and Terry,¹⁶ in our study the short arm of the miniplate was fixed in the zygomatic arch, and the long arm served as a mechanical barrier to condyle movement. With the aim of increasing the articular eminence, Puelacher and Waldhart¹² and Bakardjiev³ used the miniplate contouring it, thus creating a mechanical obstacle in the condylar path. Bakardjiev³ stated that placing bicortical screws in the zygomatic arch may decrease the chance of loosening of the miniplate. In this study the miniplates were placed according to the techniques used in these studies: the short arm of the plate was fixed with two 6-mm screws, and the long arm served as a mechanical obstacle in the condylar path placed inferior and anterior to the articular eminence.

The placement of an obstacle in the articular eminence may result in some degree of limitation of mouth opening. Removing the eminence (ie, eminectomy) may lead to hypermobility, which may cause a degeneration of the joint and excessive mouth opening¹⁰; however, according to our study, this was not found to be true. All the joints in 3 patients treated by eminectomy appeared normal on magnetic resonance images. This being so, it was to be expected that the mean preoperative MMO would be lower than the postoperative MMO. Nevertheless, the opposite was observed in this study, which might be accounted for by the presence of fibrosis, resulting from the surgical procedure itself.

Eminectomy, even when performed with rotary instruments, may leave rugged areas that could lead to crepitation of the bone during the movement of mouth opening. This is the likely explanation for the presence of crepitation in the TMJ only postoperatively in patient 3. The major complaint of patients is the condyle locking anterior to the eminence itself,

Table 3. PREOPERATIVE AND POSTOPERATIVE MAXIMAL INTERINCISAL OPENING IN EMINECTOMY AND MINIPLATE GROUPS

Treatment	Mean Maximal Interincisal Opening (mm)	
	Preoperatively	Postoperatively
Eminectomy	48.4 ± 8.5	41.3 ± 5.0
Miniplate	42.75 ± 11.53	45.62 ± 8.52

Vasconcelos and Porto. *Chronic Mandibular Dislocation. J Oral Maxillofac Surg* 2009.

Table 4. RECURRENCE IN EMINECTOMY AND MINIPLATE GROUPS

	Total [n (%)]	With Recurrence [n (%)]	Without Recurrence [n (%)]
Treatment			
Eminectomy	10 (55.56)	0 (0)	10 (55.55)
Miniplate	8 (44.44)	2 (11.11)	6 (33.33)
Total	18 (100)	2 (11.11)	16 (88.89)

Vasconcelos and Porto. *Chronic Mandibular Dislocation. J Oral Maxillofac Surg* 2009.

because it leads to a stretching of articular components, causing pain. As a result, there is a complete remission of the symptoms after treatment. No causal relationship was found for the pain reported by patient 5, and the pain that failed to subside in patient 10 was likely because of this patient's short postoperative follow-up.

Regardless of the surgical approach used to gain access to the TMJ, the final dissection places the facial nerve at risk for damage.^{17,18} A loss of function of the frontalis and orbicularis oculi muscles is always a possibility.¹⁷ The prevalence of complications, such as injury to the facial nerve, is very low,^{19,20} with rates varying from 9% to 18%²¹ and 1.5% to 32%,¹⁸ and any resulting lesion usually disappears within 6 months. Thus the correct choice of technique for making the approach to the TMJ in this study was seen to have been made, because no facial nerve paralysis was observed in any of the cases. The chosen technique⁹ allows protection to the nerve since a subperiosteal dissection along the lateral face of the zygomatic arch is made, leaving the temporal branches of the facial nerve located within the substance of the retracted flap.

Eminectomy had less chance of recurrence without creating articular damage, and by use of miniplates, the chance of recurrence increased because there is always the possibility of the miniplate fracturing, requiring a further operation for removal of the device and choice of a new treatment. Thus eminectomy was shown to be more efficient in the treatment of chronic mandibular dislocations than the use of miniplates in relation to postoperative MMO, recurrence, and articular function.

References

- Cardoso AB, Vasconcelos BCE, Oliveira DM: Comparative study of eminectomy and use of bone miniplate in the articular eminence for the treatment of recurrent temporomandibular joint dislocation. *Braz J Otorhinolaryngol* 71:32, 2005
- Hale RH: Treatment of recurrent dislocation of the mandible: Review of literature and report of cases. *J Oral Surg* 30:527, 1972

3. Bakardjiev A: Treatment of chronic mandibular dislocations by bone plates: Two case reports. *J Craniomaxillofac Surg* 32:90, 2004
4. Martínez-Pérez D, García Ruiz-Espiga P: Recurrent temporomandibular joint dislocation treated with botulinum toxin: Report of 3 cases. *J Oral Maxillofac Surg* 62:244, 2004
5. Laskin DM: Myotomy for management of recurrent and protracted mandibular dislocation. *Trans Int Conf Oral Surg* 4:264, 1973
6. Gould JF: Shortening of the temporalis tendon for hypermobility of the temporomandibular joint. *J Oral Surg* 36:781, 1978
7. Oztan HY, Ulusal BG, Turegun M, et al: Titanium screw implantation to the articular eminence for the treatment of chronic recurrent dislocation of the temporomandibular joint. *Int J Oral Maxillofac Surg* 34:921, 2005
8. House J, Brackmann DE: Facial nerve grading system. *Otolaryngol Head Neck Surg* 93:146, 1985
9. Ellis E, Zide MF (eds): *Approaches to the temporomandibular joint*, in *Surgical Approaches to the Facial Skeleton* (ed 1). Philadelphia, PA, Lippincott Williams & Wilkins, 1995, pp 163-185
10. Sato J, Segami N, Nishimura M, et al: Clinical evaluation of arthroscopic eminoplasty for habitual dislocation of the temporomandibular joint: Comparative study with conventional open eminectomy. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 95:390, 2003
11. Kuttenger JJ, Hardt N: Long-term results following miniplate eminoplasty for the treatment of recurrent dislocation and habitual luxation of the temporomandibular joint. *Int J Oral Maxillofac Surg* 32:474, 2003
12. Puelacher WC, Waldhart E: Miniplate eminoplasty: A new surgical treatment for TMJ-dislocation. *J Craniomaxillofac Surg* 21:176, 1993
13. Helman J, Laufer D, Minkov B, et al: Eminectomy as surgical treatment for chronic mandibular dislocations. *Int J Oral Surg* 13:486, 1984
14. Lovely FW, Copeland RA: Reduction eminoplasty for chronic recurrent luxation of the temporomandibular joint. *J Can Dent Assoc* 47:179, 1981
15. Oatis GW Jr, Baker DA: The bilateral eminectomy as definitive treatment: A review of 44 patients. *Int J Oral Surg* 13:294, 1984
16. Buckley MJ, Terry BC: Use of bone plates to manage chronic mandibular dislocation: Report of cases. *J Oral Maxillofac Surg* 46:998, 1988
17. van Loon JP, de Bont GM, Boering G: Evaluation of temporomandibular joint prostheses: Review of the literature from 1946 to 1994 and implications for future prosthesis designs. *J Oral Maxillofac Surg* 53:984, 1995
18. Vasconcelos BCE, Bessa-Nogueira RV, Cypriano RV: Treatment of temporomandibular joint ankylosis by gap arthroplasty. *Med Oral Patol Oral Cir Bucal* 11:E66, 2006
19. Ko EW, Huang CS, Chen YR: Temporomandibular joint reconstruction in children using costochondral grafts. *J Oral Maxillofac Surg* 57:799, 1999
20. Weinberg S, Kryshchak B: Facial nerve function following temporomandibular joint using preauricular approach. *J Oral Maxillofac Surg* 50:1048, 1992
21. Hong Y, Gu X, Feng X, et al: Modified coronoid process grafts combined with sagittal split osteotomy for treatment of bilateral temporomandibular joint ankylosis. *J Oral Maxillofac Surg* 60:11, 2002