EGYPTIAN DENTAL JOURNAL
VOL. 65, 1097:1110, APRIL, 2019
I.S.S.N 0070-9484
ORAL SURGERY
www.eda-egypt.org • Codex : 214/1901

CLINICAL AND RADIOGRAPHICAL ASSESSMENT OF TWO DIFFERENT SURGICAL TECHNIQUES FOR TREATMENT OF TEMPOROMANDIBULAR SUBLUXATION

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ABSTRACT

Aim of the study: This study aims to evaluate the efficacy of eminectomy versus T plate eminoplasty as two surgical maneuvers for treating temporomandibular joint subluxation.

Patients and Methods: The study was conducted on thirty patients suffering from bilateral TMJ subluxation. Diagnosis was confirmed by taking history, clinical examination and Tmj view radiographs. They were divided into two groups where Group I performed eminectomy while Group II inserted a T plate at the anterior border of the eminence. Clinical data including maximal mouth opening, pain, joint sounds and recurrence of subluxation episodes were collected at 1 month,3 months,6 months ,12months and 24 months postoperatively. As for the radiographic assessment cone beams were taken preoperative to exclude presence of cysts within the eminence, right postoperative, 6months ,12 months and 24 months

Results: All clinical data collected including maximal interincisal opening, pain, joint sounds and number of dislocations episodes per week showed initial improvement for the two groups but superior results were in favor of the T-plate group. Long term follow up proved the superior results of the plates with no associated side effects. On the contrary the eminectomy group showed some side effects ,the worst of all was the Tmj osteoarthritic changes detected in the CBCT within the condylar head .

Conclusion: Both surgical techniques had good results concerning TMJ subluxation. However, the plate group had superior results and no proved side effects on the long run.

KEY WORDS Tmj, subluxation, eminectomy, t-plate, cone beam

INTRODUCTION

Subluxation of the temporomandibular joint (TMJ) is defined as an abnormal excessive forward movement of the condylar head anterior to the articular eminence during wide opening of the oral cavity [(1)]. Subluxation Patients are able to spontaneously close their mouth after a brief catching of the condyle infront of the eminence [(2)].

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This episode is always associated with pain due to muscle stretching together with the presence of intraarticular effusion [3].

Subluxation of the joint is multifactorial where various factors contribute to the condition. Predisposing factors include laxity of the joint capsule, hyperactivity of the lateral pterygoid muscle and steepness of the articular eminence [4].

Accordingly, treatment of TMJ subluxation varies widely from conservative treatment to the more complicated surgical treatment.

Conservative treatment of the TMJ subluxation includes muscle rehabilitation[5], injection of sclerotic agents[6], prolotherapy[7], intraarticular blood injection [8] and Botox injection into the lateral pterygoid muscle [9].

As for the surgical treatment there are lots of surgical maneuvers advocated for treating such a condition e.g. Eminectomy [10], Dautrey operation [11] and bone grafting for the eminence to increase its height as well as increasing the articular eminence height by various methods [12][13][14][15].

Articular eminectomy was long described as treatment for TMJ subluxation by Myrhaug [16] in 1951. Since then lots of articles were published proving the efficacy of eminectomy for treating long standing subluxation [17][18]. Despite the fact that it is a widely used surgical treatment with promising results but still some articles proved the long-term complications resulting from the surgical maneuver[19]. Other studies showed that the technique sometimes fail to achieve complete treatment of the subluxation cases [20].

In the early 90s titanium miniplates were introduced by Puelachar and Waldhart [21] as an effective method of hindering condylar over translation. Several shapes and sizes were mentioned in literature since then [22]. It is technically an easy extracapsular technique with low morbidity and successful long-term results. On the other hand, several articles pointed out several drawbacks of the miniplates used in subluxation cases the most important of all is the repeated plate fracture in several studies [23] .

Cone beam CT is used widely nowadays as a reliable mean of diagnosis for different surgical procedures. This is due to several factors its relatively reasonable cost; its radiation dose is low so it is less hazardous to the patient [24].

Cone beam CT is currently used for screening TMJ osseous structures. It provides excellent quantification of the condylar surface together with its volume [25]. CBCT proved to be reliable in detecting osseous changes e.g. erosions, osteophytes which commonly occur in the condylar head, glenoid fossa and the articular eminence [26].

AIM OF THE STUDY

This study aims to evaluate both clinically and radiographically the long-term results of eminectomy versus T shaped miniplates eminoplasty for the treatment of recurrent mandibular dislocation.

PATIENTS AND METHODS

The present study included thirty patients suffering from bilateral temporomandibular joint subluxation. All Patients were collected from the outpatient clinic October 6 University. Diagnosis was based on thorough history, clinical examination and confirmed by bilateral TMJ view showing the condyle in an anterior position to the articular eminence during maximal mouth opening.

Exclusion criteria included patients with chronic debilitating disease, patients with neurological disorders and patients who were previously treated by any surgical maneuver for Tmj subluxation.

Inclusion criteria included patients with at least three subluxation episodes per week associated with pain. All patients included in the study failed to respond to conservative treatment e.g. Botox injection, prolotherapy or intraarticular blood injection.

Patients allocated in the study were informed by the study program and gave their consent on both surgical procedures and the related possible complications. Patients included were 22 females and 8 males with age ranging between 22 and 62 years. Data collected from each patient included maximal interincisal opening, presence of joint sounds e.g. Clicking, crepitations, number of dislocation episodes per week, presence of pain and its degree according to visual analogue scale from zero to ten. Cone beam CT was done preoperatively for each patient to assess eminence height and rule out the presence of cyst within the eminence.

Patients were randomly divided into two equal groups fifteen patients each. All surgical procedures were done by the same surgeon and followed the same surgical protocol. Group I performed

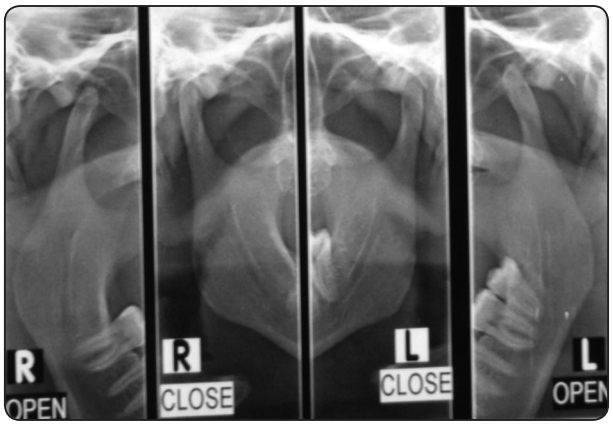

Fig. (1) TMJ view showing bilateral forward movement of the TMJ condyle anterior to the eminence

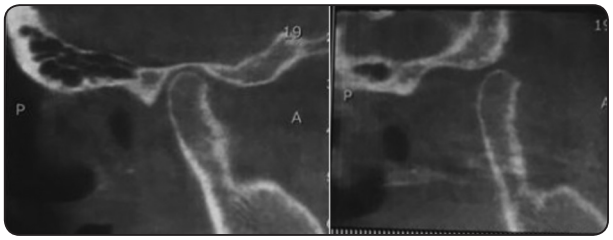

Fig. (2) Shows : CBCT confirming diagnosis and excluding presence of cysts within articular eminence

eminectomy, whereas Group II placed a t shaped titanium miniplate along the anterior surface of the articular eminence.

Eminectomy surgical Technique:

The surgical procedure was done under general anesthesia were the patient was draped and prepared as the regular surgical manner. Exposure of the joint was done using a preauricular incision. After exposure and identification of the articular eminence a surgical bur was used to reduce the eminence height. Holes were drilled throughout the eminence then joined with one cut. The eminence was reduced till it reaches a depth ensuring smooth gliding of the condyle with no restrictions but should never go below the articular fossa. The eminence is totally removed till its medial margins then smoothening of the borders was performed. It has to be noted that bone removal was done under copious saline irrigation. Functional movements of the mandible were reproduced to ensure the absence of any catching of the condyle during its forward movement.

Fig. (3) A shows; preauricular incision, B: shows temporalis fascia dueing dissection, c shows dissection to reach the articular eminence

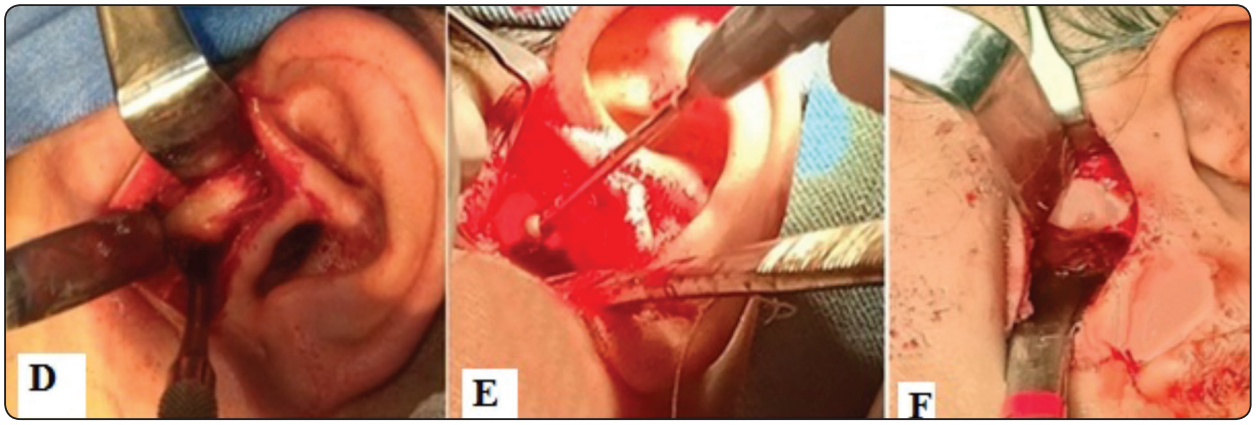

Fig. (4) Showing: D; exposure of the articular eminence E; Reduction of the eminence height , F; eminence is reduced in height

Miniplate Eminoplasty Technique

Preparation of the patient and surgical exposure of the joint was performed as mentioned previously. The lateral surface of the articular eminence together with the posterior part of the zygomatic arch were identified. Condylar movements were observed by passive functional mandibular movements to determine the appropriate place for the miniplate* placement. The horizontal arm of the miniplate was fixed to the root of the zygomatic arch using two 6mm,2.0mm diameter screws. As for the vertical longer arm it was adapted slightly anterior to the articular eminence to act as a mechanical stopper for the condylar path. Jaw movements were checked for any interferences and necessary adjustments were done.

Both surgical procedures were performed without violating the Tmj capsule and after the procedure is finished the surgical site is closed in layers following the routine surgical protocol.

Postoperatively patients were prescribed antibiotics and analgesics for one week. All patients were asked to start gradual mandibular movements the following day and to restrict to soft diet for one week,

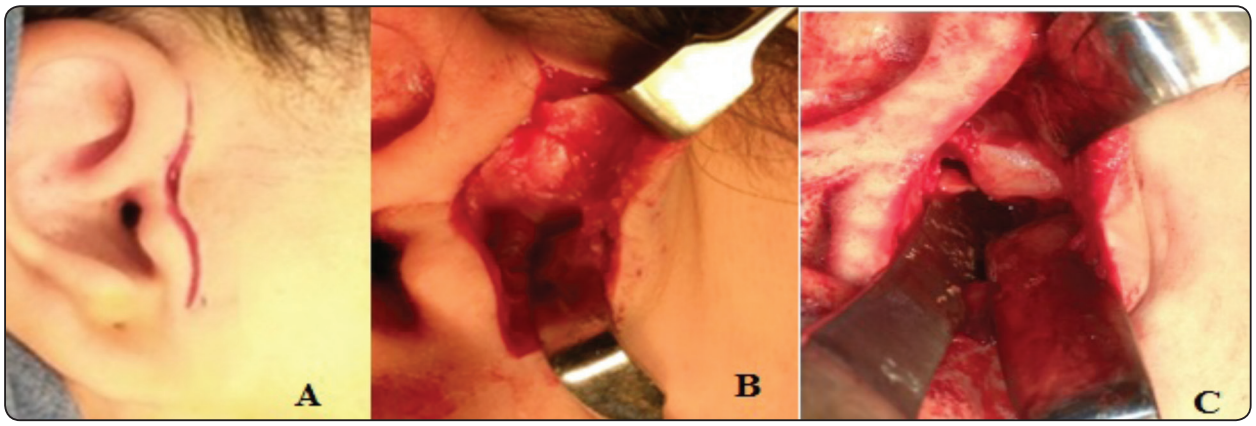

Fig. (5) A; showing incision to gain access to articular eminence, B;dissection to gain access to the eminence, C; exposure of the articular eminence

in*2.o miniplates Le Forte System, Joel Medical corporation ,Seoul Korea

Postoperative data collected included maximal interincisal opening, joint sounds, number of subluxation episodes per week and pain (measured according to visual analogue scale 0-10). Data were collected 1 month,3 months,6 months ,12months and 24 months postoperatively.

Cone beam CT was performed for each patient immediately postoperative then after 6,12 and 24 months for both groups

Fig. (6) D; fixation of the miniplate in the anterior surface of eminence, E surgical field is closed in layers F; closure of the incision

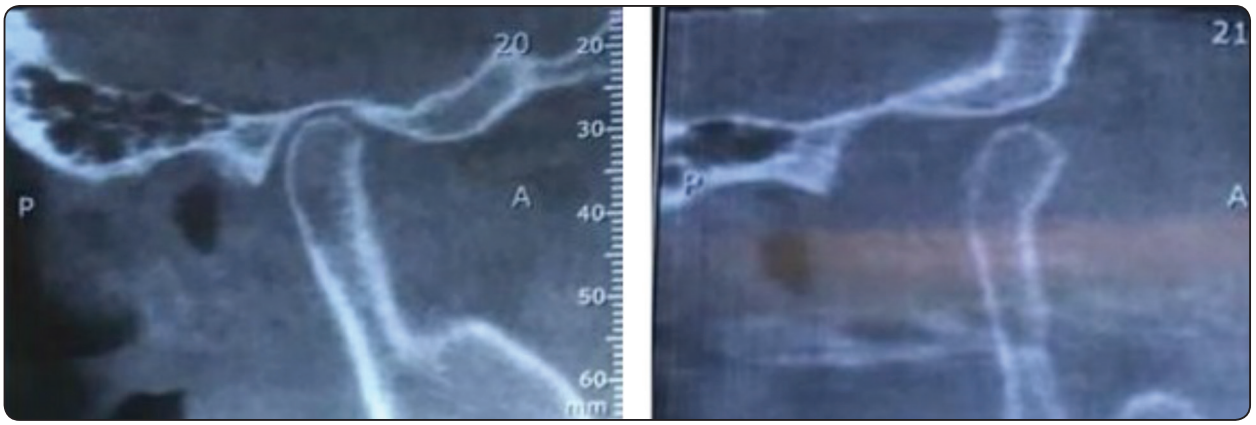

Fig. (7) Immediate postoperative CBCT for eminectomy group (Group I)

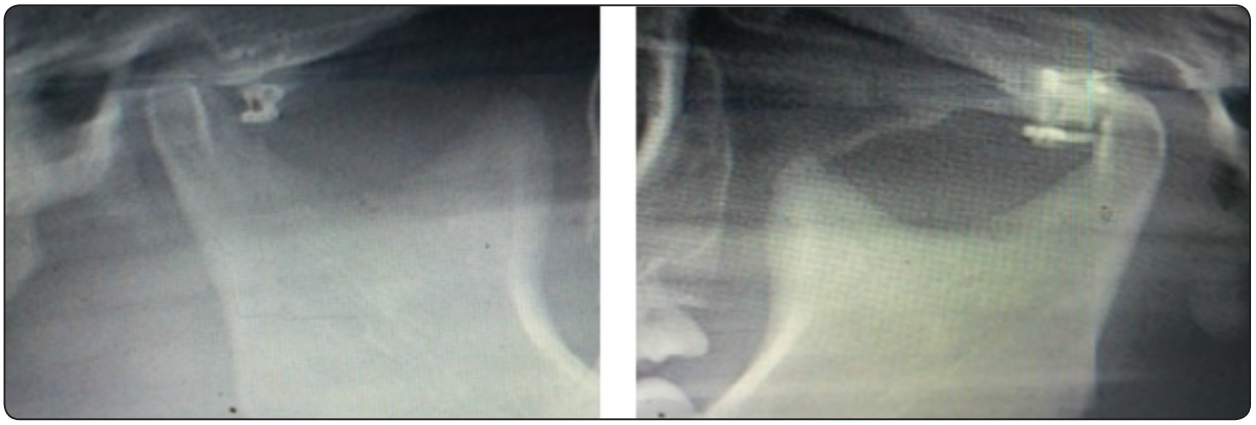

Fig. (8) Immediate postoperative CBCT for the T plate group (Group II)

Fig. (9) Postoperative CBCT at 24 months: A Group I eminectomy, B Group II mini plate eminoplasty with plate in place

Data were collected and submitted for statistical analysis

Statistical Analysis

Numerical data were explored for normality by checking the distribution of data and using tests of normality (Kolmogorov-Smirnov and Shapiro-Wilk tests). Age, maximum inter-incisal opening data showed normal (parametric) distribution while pain scores showed non-normal (non-parametric) distribution. Parametric data were presented as mean, standard deviation (SD) and 95% Confidence Interval (95% CI) values. Non-parametric data were presented as median and range values. For parametric data, Student's t-test was used to compare between mean age values in the two groups. Repeated measures ANOVA test was used to compare between mean maximum inter-incisal opening in the two groups as well as to study the changes by time within each group. Bonferroni's post-hoc test was used for pair-wise comparisons when ANOVA test is significant. For non-parametric data, Mann-Whitney U test was used to compare between the two groups. Friedman's test was used to study the changes by time within each group. Dunn's test was used for pair-wise comparisons.

Qualitative data were presented as frequencies and percentages. Chi-square test and Fisher's Exact test when applicable were used for comparisons between the groups. Friedman's test was used to study the changes by time within each group.

The significance level was set at $P \leq 0.05$. Statistical analysis was performed with IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp

RESULTS

Demographic data:

There was no statistically significant difference between mean age values in the two groups. There was also no statistically significant difference between gender distributions in the two groups.

TABLE (1) Mean, standard deviation (SD), frequencies (n), percentages and results of Student's t-test and Fisher's Exact tests for comparisons of demographic data of the two groups

	Eminectomy (n = 15)	Mini-plate (n = 15)	*P*-value
Age (Years)			
Mean (SD)	42.3 (11.7)	39.3 (10.4)	0.474
Gender [n (%)]			
Male	3 (20)	5 (33.3)	0.682
Female	12 (80)	10 (66.7)	

**: Significant at P ≤ 0.05*

Maximum inter-incisal opening

Pre-operatively, there was no statistically significant difference between maximum inter-incisal opening in the two groups (*P*-value = 0.776, Effect size = 0.003).

Eminectomy group showed statistically significant higher maximum inter-incisal opening than mini-plate group after 1 month, (*P*-value <0.001, Effect size = 0.508), 3 months (*P*-value <0.001, Effect size = 0.860), 6 months (*P*-value <0.001, Effect size = 0.867), 12 months (*P*-value <0.001, Effect size = 0.864) and 24 months (*P*-value <0.001, Effect size = 0.413).

As regards the changes by time in Eminectomy group, there was a statistically significant change in maximum inter-incisal opening by time (*P*-value =0.001, Effect size = 0.559). Pair-wise comparisons between the time periods revealed that there was no statistically significant change in maximum inter-incisal opening after 1 month. From 1 to 3 months, there was a statistically significant increase in mean maximum inter-incisal opening followed by non-statistically significant change from 3 to 6 months as well as from 6 to 12 months. From 12 to 24 months, there was a statistically significant decrease in mean maximum inter-incisal opening. The mean maximum inter-incisal opening after 24 months showed non-statistically significant difference from pre-operative measurement.

While in mini-plate group, there was a statistically significant change in maximum inter-incisal opening by time (*P*-value <0.001, Effect size = 0.734). Pair-wise comparisons between the time periods revealed that there was a statistically significant decrease in maximum inter-incisal opening after 1 month. From 1 to 3, 3 to 6, 6 to 12 as well as from 12 to 24 months, there was no statistically significant change in mean maximum inter-incisal opening. The mean maximum inter-incisal opening after 24 months showed statistically significantly lower mean value compared with pre-operative maximum inter-incisal opening measurement.

Joint sounds

Pre-operatively, there was no statistically significant difference between prevalence of joint sounds in the two groups (*P*-value = 1.000, Effect size = 0.111).

Eminectomy group showed statistically significantly higher prevalence of joint sounds than mini-plate group after 1 month, (*P*-value =0.002, Effect size = 0.623), 3 months (*P*-value =0.002, Effect size = 0.566), 6 months (*P*-value =0.035, Effect size = 0.452), 12 months (*P*-value =0.035, Effect size = 0.452) and 24 months (*P*-value =0.014, Effect size = 0.509).

As regards the changes by time in Eminectomy group, there was a statistically significant change in prevalence of joint sounds by time (*P*-value =0.049, Effect size = 0.149). There was a decrease in joint sounds after 1 month, from 1 to 3 months as well as 3 to 6 months. Prevalence of joint sounds didn't change from 6 to 12 month and increased from 12 to 24 months.

It is worth mentioning that patients reported change in the character of the sound associated with jaw movements postoperatively. Three of our patients couldn't describe or name the change in sound character but four of them reported that the sound changed its character more to a grating or friction sound .

As regards mini-plate group, there was a statistically significant change in prevalence of joint sounds by time (*P*-value <0.001, Effect size = 0.867). There was a decrease in joint sounds after 1 month. Prevalence of joint sounds didn't change from 1 month till the end of follow up period.

Number of dislocation episodes

Pre-operatively, the median number of dislocation episodes in Eminectomy group was 10 episodes with a minimum of 5 and a maximum of 15 episodes. The median number of dislocation episodes in mini-plate group was 10 episodes with a minimum of 7 and a maximum of 13 episodes. There was no statistically significant difference between number of dislocation episodes in the two groups (*P*-value = 0.800, Effect size = 0.091).

TABLE (2) Descriptive statistics and results of repeated measures ANOVA test for comparison between maximum inter-incisal opening in the two groups as well as the changes by time within each group

Time	Eminectomy (n = 15)	Mini-plate (n = 15)	*P*-value	*Effect size (Partial Eta Squared)*
Pre-operative				
Mean (SD)	47.9 (3.9) [B]	48.4 (4.9) [A]	0.776	0.003
95% CI	45.6 – 50.3	46.1 – 50.7		
1 month				
Mean (SD)	48.1 (4) [B]	41.7 (2.3) [B]	<0.001*	0.508
95% CI	46.4 – 49.8	40 – 43.4		
3 months				
Mean (SD)	50.7 (1.8) [A]	41.3 (2.1) [B]	<0.001*	0.860
95% CI	49.6 – 51.7	40.3 – 42.4		
6 months				
Mean (SD)	50.5 (1.8) [A]	41.3 (2) [B]	<0.001*	0.867
95% CI	49.5 – 51.6	40.3 – 42.3		
12 months				
Mean (SD)	50.3 (1.6) [A]	41.3 (2.1) [B]	<0.001*	0.864
95% CI	49.3 – 51.2	40.4 – 42.3		
24 months				
Mean (SD)	47.2 (4.6) [B]	41.4 (2) [B]	<0.001*	0.413
95% CI	45.3 – 49.1	39.5 – 43.3		
P-value (Changes by time)	0.001*	<0.001*		
Effect size (Partial Eta Squared)	0.559	0.734		

: Significant at P ≤ 0.05, Different superscripts in the same column indicate statistically significant changes by time

TABLE (3) Descriptive statistics and results of Chi-square, Fisher's Exact and Friedman's tests for comparison between prevalence of joint sounds in the two groups as well as the changes by time within each group

Time	Eminectomy (n = 15)		Mini-plate (n = 15)		*P*-value	*Effect size (v)*
	n	%	n	%		
Pre-operative	13	86.7	14	93.3	1.000	0.111
1 month	10	66.7	1	6.7	0.002*	0.623
3 months	9	60	1	6.7	0.002*	0.566
6 months	7	46.7	1	6.7	0.035*	0.452
12 months	7	46.7	1	6.7	0.035*	0.452
24 months	8	53.3	1	6.7	0.014*	0.509
P-value (Changes by time)	0.049*		<0.001*			
Effect size (w)	0.149		0.867			

: Significant at P ≤ 0.05

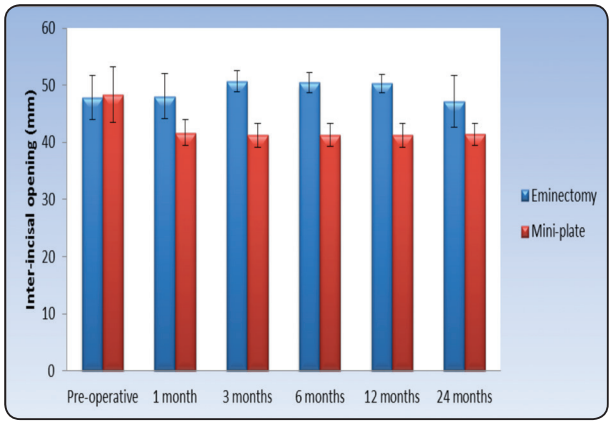

Fig. (10) Bar chart representing mean and standard deviation values for maximum inter-incisal opening in the two groups

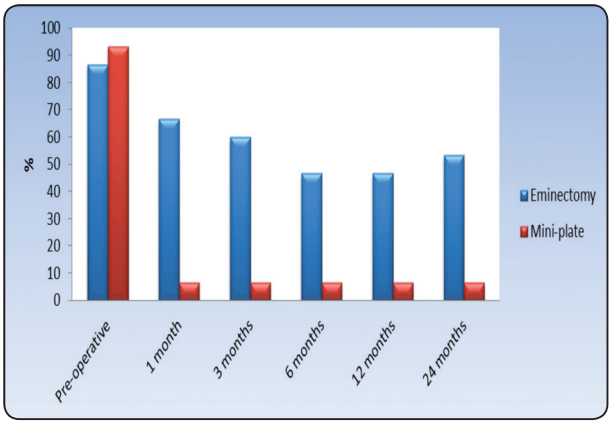

Fig. (11) Bar chart representing prevalence of joint sounds in the two groups

Dislocation episodes disappeared through all the follow up period in the two groups.

Pain (VAS) scores

There was no statistically significant difference between pain scores in the two groups preoperatively (*P*-value = 0.566, Effect size = 0.206), after 1 month (*P*-value = 0.490, Effect size = 0.236), 3 months (*P*-value = 0.929, Effect size = 0.023), 6 months (*P*-value = 0.701, Effect size = 0.091) and 12 months (*P*-value = 0.128, Effect size = 0.442).

Eminectomy group showed statistically significantly higher median pain scores than mini-plate group after 24 months (*P*-value =0.009, Effect size = 0.896).

As regards the changes by time in Eminectomy group, there was a statistically significant change in pain scores by time (*P*-value <0.001, Effect size = 0.746). Pair-wise comparisons between the time periods revealed that there was a statistically significant decrease in median pain scores after 1 month. From 1 to 3, 3 to 6, 6 to 12 as well as from 12 to 24 months, there was no statistically significant change in median pain scores.

TABLE (4) Descriptive statistics and results of Mann-Whitney U test for comparison between pain scores in the two groups and Friedman's test for the changes by time within each group

Time	Eminectomy (n = 15)		Mini-plate (n = 15)		*P*-value	*Effect size (d)*
	Median	Range	Median	Range		
Pre-operative	8 ^{A}	6 – 10	9 ^{A}	6 – 10	0.566	0.206
1 month	0 ^{B}	0 – 5	1 ^{B}	0 – 5	0.490	0.236
3 months	0 ^{B}	0 – 4	0 ^{B}	0 – 5	0.929	0.023
6 months	0 ^{B}	0 – 3	0 ^{B}	0 – 5	0.701	0.091
12 months	0 ^{B}	0 – 4	0 ^{B}	0 – 5	0.128	0.442
24 months	1 ^{B}	0 – 8	0 ^{B}	0 – 5	0.009*	0.896
P-value (Changes by time)	<0.001*		<0.001*			
Effect size (w)	0.746		0.857			

: Significant at P ≤ 0.05, Different superscripts in the same column indicate statistically significant changes by time

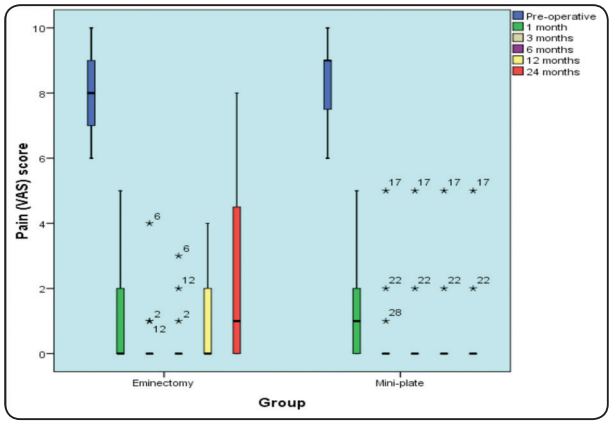

Fig. (12) Box plot representing median and range values for pain scores in the two groups (Stars represent outliers)

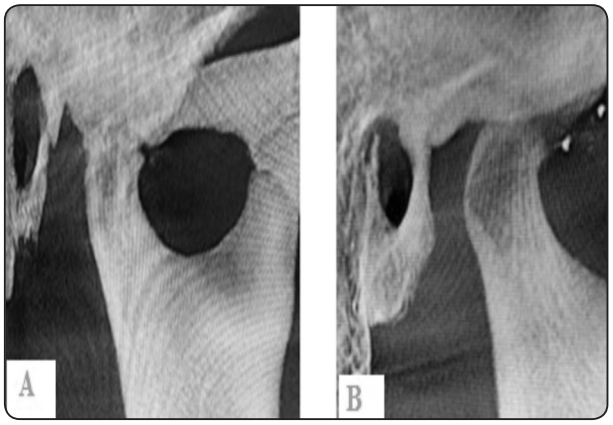

Fig. (13) CBCT immediate PO showing; A reduced eminence height B hypertranslation of the condyle during mouth opening

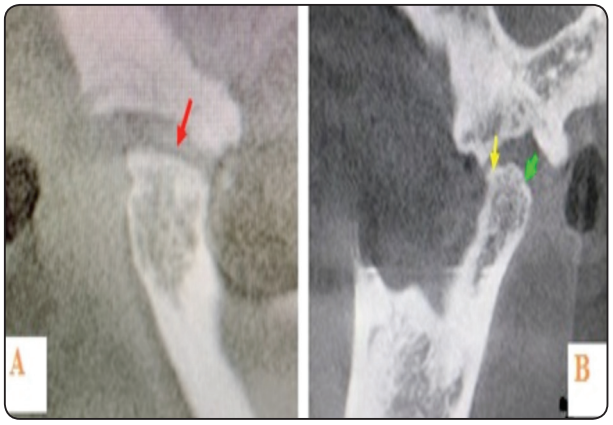

Fig (14) A CBCT at 12 months PO showing flattening of the condyle (red arrow), B shows CBCT at 24 months PO showing osteophytic changes (yellow arrow and bone erosion green arrow)

Similarly, in mini-plate group, there was a statistically significant change in pain scores by time (*P*-value <0.001, Effect size = 0.857). Pair-wise comparisons between the time periods revealed that there was a statistically significant decrease in median pain scores after 1 month. From 1 to 3, 3 to 6, 6 to 12 as well as from 12 to 24 months, there was no statistically significant change in median pain scores.

Radiographic Findings

Cone beam CT was performed for each patient in both groups immediate postoperative (within 48 hours after the surgical procedure). Cbct of the eminectomy group showed the reduction of the eminence height with hyper translation of the condyle during mouth opening.

At six months Postoperative there was no notable bony changes seen either in the condyle or the glenoid fossa.

CBCT done at 12 months postoperative flattening of the condyle in six cases was obvious which indicated the beginning of osteoarthritic changes. By the end of the follow up period (24 months) seven patients showed osteoarthritic changes of the condyle including condylar flattening, osteophytes and bone erosion.

As for the T plates group also a CBCT was done immediate postoperative mainly to ensure the correct position of the plate. It was also noted that during mouth opening the condyle hyper translatory movement is greatly limited due to the presence of the plates

At six months, 12months and 24 months there was no evidence of any bony changes. It is worth mentioning that throughout the follow up period the T plates in all patients were in the same place and no plate fracture or screw loosening was detected in any of the patients at any time within the follow up period.

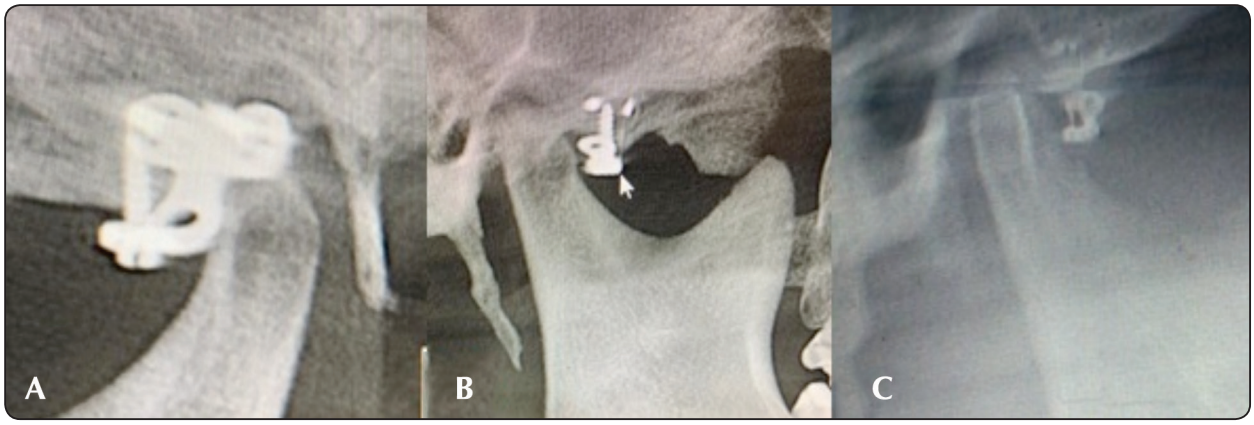

Fig 15 ;CBCT of the t plate group,A immediate postoperative ,B;12 months postoperative C;24 months post operative

DISCUSSION

Subluxation is a disturbing malfunction of the Temporomandibular joint. It is very alarming to the patient as it limits normal mouth activities and is usually associated with pain due to stretching of the articular components [24] . TMJ subluxation is surgically treated by two main principles either removing the eminence completely or augmenting its height thus preventing the painful anterior catching episodes of the condyle. Studies carried on the surgical treatment of Tmj subluxation are relatively few in number and many of these studies have the problem of small sample size, short follow up period or lack of proper radiographical follow up [25].

The present study compared the efficacy of eminectomy versus t-plate eminoplasty in Tmj subluxation both clinically and radiographically with a follow up period of 24 months. The study was conducted on thirty patients suffering from bilateral Tmj subluxation all patients were previously treated with conservative measures but failed to achieve any satisfactory results. Patients were randomly assigned to any of the two groups, preoperative data collected included patient demographics, maximal interincisal opening, joint sounds, number of dislocation episodes per week and pain. Cone beam CT was done for each patient preoperatively and postoperatively; immediately postoperative at 6,12 and 24 months.

Results of our study concerning patients' demographics showed no statistical difference between the two groups concerning the age and gender distribution. But there was a female prevalence within each group and this finding was reported in several previous publications [26].

Regarding the clinical results both groups showed variable clinical success rate. The eminectomy group showed initial marked increase in maximal interincisal opening followed by a decrease to the preoperative measurements. The results achieved in this study perfectly matches the type of procedure as it removes the obstacle infront of the condyle rendering it free to move anteriorly. This finding correlates with that obtained by Mayrink et al[27] although reported by many authors the immediate decrease of mouth opening and was verified by the fibrosis resulting from the long term dislocation [26] or due to patients fear from dislocation episode if they opened widely[27]. Undt et al [17] in a study evaluating clinical outcomes of eminectomy in long standing subluxation patients proved that no change between preoperative and postoperative mouth opening measurements, this finding agrees with final measurements in our study.

Concerning the t-plate eminoplasty group there was a significant decrease in the mouth opening postoperatively which was maintained all through the 24 months follow up. This is well explained by the nature of the treatment as the goal of the treatment is to place an obstacle to limit the excessive condyle hyper translation. This finding correlates with previous studies carried by Puelacher and Waldhart[21] in the early nineties where they placed miniplates to abate condylar hyper translation their results were in favor of the technique as no recurrence of dislocation was observed also no fracture or loosening of the plates was detected in any of the cases

On the contrary our finding disagrees with those of Kuttenberger and Hardt [23] in 2003 in a study conducted on twenty patients where the mouth opening was not changed after the t plate insertion.

The fact that the eminectomy group still suffer from laxity of the joint and stretching of intraarticular contents explains the reason that pain value of this group showed high scores throughout the follow up period. It is worth mentioning that the CBCT of six of the eminectomy group showed signs of osteoarthritic changes with variable degrees also provides a valid explanation for the high pain score level within this group. It is worth mentioning that six of the eminectomy patients complained of constant pain which sometimes needed analgesics. This finding in our present study correlates with those obtained by Sato [28] and Undt [30]. On the other hand, pain score within the t plate group was greatly decreased in all patients throughout the follow up period except for three patients who reported continuous discomfort and mild pain. This result matches those of Chausse et al [31] and those of Essa [32] in a study evaluating the validity of T plates in treating Tmj dislocation pain was dramatically decreased after the procedure. On the other hand, it was reported by several studies [17] that pain was reported by patients after performing t plate eminoplasty where pain was explained to be due to the metallic plate.

As for the joint sounds both groups reported preoperative joint sounds during normal function. Whereas seven of the eminectomy group reported postoperative joint sounds but they stressed on the change in sound character than that of the preoperative stage .This is explained by the change of the cause, as the preoperative sound was more like clicking and this was due to the condyle hitting the eminence during excessive forward movement .While joint sounds experienced postoperative is near to crepitations which was explained by several authors to be a result of the ragged bone surface caused by the surgical bur during the eminence removal [28] Crepitations present in the eminectomy group at twenty four months postoperative may be due to the osteoarthritic changes seen in the condyles of the same patients. This finding agrees with those of Vasconcelos, et al [22] in a retrospective study of ten patients suffering from chronic joint dislocation and all were treated with eminectomy only one of their patients complained of crepitations postoperatively. Escoda [29] in 1987 reported such findings after treating fourteen subluxated joints with eminectomy with and without directioning of the temporalis muscle.

Joint sounds in Group II significantly decreased within one months postoperative except for one patient who reported popping sound from time to another. This result blends completely with those of Cavalcanti et al [33]

As for the recurrence of the dislocation episodes both groups showed disappearance of these episodes by the end of the follow up period except for one case only in Group I who reported the recurrence of the subluxation after six months of the operation and refused to seek any further intervention. This finding agrees with those of Undt [1] et al and Ohta et al [34] .

Radiographic assessment of this study depended mainly on the CBCT which is regarded as a convenient means of bony changes within the joint. By the end of the follow up period seven patients

of the eminectomy group showed evidence of osteoarthritic changes e.g. presence of osteophytes, bony and condylar erosions as well as flattening of the condyle. These radiological findings correlate with those of Undt et al [17] and Cardoso et al [29]. As for the t plate eminoplasty no bony changes were detected at the end of the follow up period although some previous studies reported notching of the condyle but this was not detected in any of our patients.

Although many papers reported plate fracture as Shebata et al [35] who reported one plate fracture among 15 inserted plates accordingly another operation was performed for plate removal, but this wasn't the case with any of our patients. Plate fracture was thought to occur due to the over bending of the vertical long arm and the place of plate insertion [23]. In the present study, the design of the plate used doesn't require over bending due to its small 3size. Plates were all inserted within the zygomatic arch as recommended by several articles [22,21].

Although eminectomy was strongly recommended by lots of studies which proved the superior results of eminectomy over the t plates[29] [27] .But this is not the case in our present study where all criteria are in favor of the t plate eminoplasty ,this may be due to the fact that the used plates in the present study do not require overbending for adaptation .Choosing CBCT as means of follow up allowed better assessment of both techniques ,hence correlating radiographic findings with the clinical results.

Depending on the results obtained in the present study we strongly recommend the use of Tplate eminoplasty in cases of chronic TMJ subluxation.

CONCLUSION

According to results obtained from the present study we conclude that both eminectomy and T plate eminoplasty are efficient means of treating Tmj subluxation .However in order to obtain more reliable results a larger study group should be followed up for a longer period of time.

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