

ORIGINAL RESEARCH

Comprehensive Assessment of Flapless Corticotomy in Orthodontic Rehabilitation (Rapid) Of Class I and Class II Malocclusion Cases: An Original Research Study

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ABSTRACT

Aim: The exclusive aim of this study was to assess flapless corticotomy in orthodontic rehabilitation (rapid) of class I and class II malocclusion cases

Materials & Methods: Total 40 patients were finalized for study. Both male and females were included in the age range of 19 to 25 years. Patients those requiring orthodontic correction for their malocclusion class I and class II were approached initially. Fixed orthodontic appliances were planned to be provided for their treatment. Group one has 20 patients who undergone piezocision assisted treatment for correction of class I and class II malocclusion. Group two has 20 patients (control). Simple random technique was used for precise selection of patients without any selection bias. All patients with any underlying bony disorders, systemic delinquencies were excluded from the study. Time taken and amount of effective distalization of canine and associated loss of any anchorage was observed carefully to outline the results. P value less than 0.05 was considered significant ($p < 0.05$).

Statistical Analysis and Results: Statistical analysis was completed by using statistical software Statistical Package for the Social Sciences. The mean distalization time for Group I was 3.62 while it was 4.90 for Group II. P value was highly significant for Group I patients. The mean distalization amount for Group I was 1.38 while it was 0.62 for Group II. P value was highly significant for Group I patients. For anchorage loss in group I, the mean value was 2.68 and for group II it was 4.12. p value was highly significant for group I.

Conclusion: Authors concluded that orthodontic treatment assisted with piezocision techniques is highly valuable since it offer sufficient distalization in lesser time with minimum anchorage loss. Therefore, this technique can be utilized as and when required in the indicated situation so as to achieve acceptable results.

Key words: Distalization, Piezocision, Orthodontic Treatment, Malocclusion, Corticotomy

INTRODUCTION

The term corticotomy is not new and it was originally introduced as a surgical procedure to lessen orthodontic treatment time. Corticotomy actually eliminates the cortical bone which usually opposes orthodontic forces applied in the jaws for different esthetic corrections. Many of the researchers have also demonstrated that corticotomy procedure actually keeps the marrow bone to sustain blood circulation and associated continuity of bone tissues.¹⁻⁴ It also diminishes the relative risk of cell death and assists tooth movement. In early 2008, many of the pioneer workers have conducted and experimented the corticotomy by conventional flap raise. They also utilized novel piezosurgery technique for rapid tooth movement/rapid orthodontics. Later, many clinicians have tried this method and confirmed that piezosurgery without flap elevation is a viable method and can be utilized as an alternative technique in order to save time and achieve optimal results.⁵⁻⁷ They later on termed it as Piezocision. Literature has well evidenced that this method is usually conducted/started with an interdental gingival incision coupled with corticotomy with suitable armamentarium. Before this invention, loss of anchorage and longer treatment time was a clinical dilemma for most of the clinicians.^{2,5,8,9} Hence keeping all these appealing factors in the mind, this study was planned to assess flapless corticotomy in orthodontic rehabilitation (rapid) of class I and class II malocclusion cases.

MATERIALS & METHODS

The study was planned and executed logically to test the intended hypothesis. The study participants were selected on the basis of their treatment needs. Total 40 patients were finalized for study. Both male and females were included in the age range of 19 to 25 years. All patients have been informed about the study in detail and informed signed consents were also obtained accordingly from their parents. Patients those requiring orthodontic correction for their malocclusion class I and class II were approached initially. Fixed orthodontic appliances were planned to be provided for their treatment. Group one has 20 patients who undergone piezocision assisted treatment for correction of class I and class II malocclusion. Group two has 20 patients (control). Simple random technique was used for precise selection of patients without any selection bias. In all cases, only first maxillary premolars were extracted to create spaces. Following this, required incisions were made and localized piezocision Corticotomies were attempted in order to treat class I and class II malocclusion. This was additionally assisted and precised by prefabricated radiographic guide. This guide was made for accurate location and positioning of the surgical start points. Local anesthesia was employed in all required circumstances. Inclusion criteria included male and female patients in the age range of 19 to 25 years, patients with class I and class II malocclusion. All patients with any underlying bony disorders, systemic delinquencies were excluded from the study. Time taken and amount of effective distalization of canine and associated loss of any anchorage was observed carefully to outline the results. Patients with any kind of follow up problem were excluded from the study. Patients with any type of ongoing medication for any other disease were also excluded from the study as it can hamper with the accurateness of the results. The privacy, self rule and other related human rights of the patients along with their freedom of expression were kept completely confidential even after completion of the study. Results and data was compiled in table and sent for basic statistical analysis. P value less than 0.05 was considered significant ($p < 0.05$).

STATISTICAL ANALYSIS AND RESULTS

All relevant findings and details were sent for statistical analysis using statistical software Statistical Package for the Social Sciences version 21 (IBM Inc., Armonk, New York, USA). Appropriate statistical tests were also utilized to obtain p values, mean, standard deviation,

chi-square test, standard error and 95% CI. Table 1 and Graph 1 showed that out of 40 patients, males were 25 and females were 15. All patients were also studied according to their ages in to 4 groups. All patients were in the age range of 19 to 25 years. Maximum 16 patients were in the age group of 21-22 years. Minimum 3 patients were seen in the age of 25 years. P value was very significant for the age range of 23-24. It was 0.01. Table 2 shows about basic statistical explanation with level of significance evaluation using pearson chi-square test [for canine distalization time]. The mean distalization time for Group I was 3.62 while it was 4.90 for Group II. P value was highly significant for Group I patients. It was interestingly 0.02. Table 3 shows about basic statistical explanation with level of significance evaluation using pearson chi-square test [for distalization amount]. The mean distalization amount for Group I was 1.38 while it was 0.62 for Group II. P value was highly significant for Group I patients. It was interestingly 0.01. Table 4 showed about basic statistical explanation with level of significance evaluation using pearson chi-square test [for anchorage loss]. For group I, the mean value was 2.68 and for group II it was 4.12. p value was highly significant for group I. it was 0.01. Table 5 showed the basic comparison among the 2 study groups using one-way ANOVA [for group I,II]. Level of Significance (p) was highly significant here. It was 0.001.

Table 1: Age & Gender Based Details Of Participants

Age Group (Yrs)	Male	Female	Total	P value
19-20	8	7	15	0.07
21-22	12	4	16	0.20
23-24	3	3	6	0.01*
25	2	1	3	0.20
Total	25	15	40	*Significant
*p<0.05 significant				

Table 2: Basic statistical explanation with level of significance evaluation using pearson chi-square test [for canine distalization time]

For canine distalization time							
Groups	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Group I	3.62	0.948	0.647	1.96	1.324	1.0	0.02*
Group II	4.90	0.941	0.504	1.96	2.535	2.0	0.09
*p<0.05 significant							

Table 3: Basic statistical explanation with level of significance evaluation using pearson chi-square test [for distalization amount]

for distalization amount							
Groups	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Group I	1.38	0.847	0.298	1.02	1.536	1.0	0.01*
Group II	0.62	0.637	0.466	1.96	2.152	2.0	0.08
*p<0.05 significant							

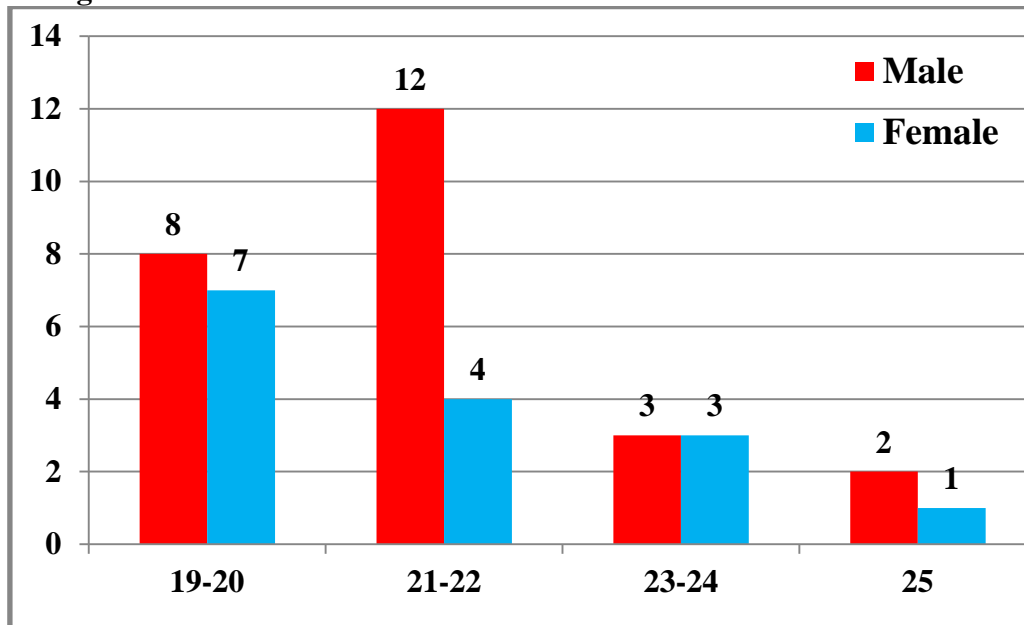
Table 4: Basic statistical explanation with level of significance evaluation using pearson chi-square test [for anchorage loss]

For anchorage loss							
Groups	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Group I	2.68	0.847	0.298	1.02	1.536	1.0	0.01*
Group II	4.12	0.637	0.466	1.96	2.152	2.0	0.08
*p<0.05 significant							

Table 5: Comparison among the 2 study groups using one-way anova [for group i, ii]

Variables	Degree of Freedom	Sum of Squares Σ	Mean Sum of Squares $m\Sigma$	F	Level of Significance (p)
Between Groups	3	2.321	1.738	2.4	0.001*
Within Groups	21	6.324	0.038		-
Cumulative	122.13	12.033	*p<0.05 significant		

Graph 1: Age & Gender Wise Distribution Of Patients



DISCUSSION

Rapid orthodontics is not a newer term these days and practiced very frequently worldwide. This technique offers fast distalization in lesser time. It also exhibits minimum loss of anchorage as compared to traditional orthodontic approaches.¹⁰⁻¹² With the ever increasing awareness and expectancy, patients usually demands for fast treatment results and outcome. This is particularly true in orthodontic therapies since most of the orthodontic interventions take long time which is very frustrating for patients as well as clinicians. In the recent past many of the researchers have experimented surgical interventions on the alveolar ridges to fasten orthodontic treatment. Many surgically assisted fast orthodontic techniques have been tried and recommended.¹³⁻¹⁵ Many techniques like alveolar decortications along with bone

grafting were also tried. This was essentially introduced to expand alveolar volume and allow fats tooth movement into the freshly expanded sites.¹⁶⁻¹⁷ This method, along with corticotomy helps in orthodontic treatment. Later, few researchers have originally experimented and patented this technique as a less invasive alternative to remove the intended bone without flap reflection. Even if corticotomy is a surgical procedure, this technique seems to effectively lessen the resistance of bone during tooth movement. In this way it lessens the timing of orthodontic treatment and minimizing undesirable effects on teeth.

CONCLUSION

Within the limitations of the study authors concluded very interesting inferences. It was shown that orthodontic treatment assisted with piezocision techniques is highly valuable since it offer sufficient distalization in lesser time with minimum anchorage loss. Therefore, this technique can be utilized as and when required in the indicated situation so as to achieve acceptable results. Authors expect some other studies to be performed with larger samples size and in-depth analysis.

REFERENCES

1. Verna C, Cattaneo PM, Dalstra M. Corticotomy affects both the modus and magnitude of orthodontic tooth movement. *Eur J Orthod.* 2018;40:107–112.
2. Ouejjaraphant T, Samruajbenjakun B, Chaichanasiri E. Determination of the centre of resistance during en masse retraction combined with corticotomy: finite element analysis. *J Orthod.* 2018;45:11–15.
3. Medeiros RB, Pires FR, Kantarci A, Capelli J., Jr Tissue repair after selective alveolar corticotomy in orthodontic patients: a preliminary study. *Angle Orthod.* 2018;88:179–186.
4. Lee JM, Kim MG, Byun JH, Kim GC, Ro JH, Hwang DS, et al. The effect of biomechanical stimulation on osteoblast differentiation of human jaw periosteum-derived stem cells. *Maxillofac Plast Reconstr Surg.* 2017;39:7.
5. Generson RM, Porter JM, Zell A, Stratigos GT. Combined surgical and orthodontic management of anterior open bite using corticotomy. *J Oral Surg* 1978;36:216–219.
6. Suya H. Corticotomy in orthodontics. In: Hosl E, Baldauf A (eds). *Mechanical and Biological Basics in Orthodontic Therapy.* Heidelberg: Hutlich Buch, 1991:207–226.
7. Wilcko WM, Wilcko T, Bouquot JE, Ferguson DJ. Rapid orthodontics with alveolar reshaping: Two case reports of decrowding. *Int J Periodontics Restorative Dent* 2001;21:9–19.
8. Wilcko WM, Ferguson DJ, Bouquot JE, Wilcko T. Rapid orthodontic decrowding with alveolar augmentation: Case report. *World J Orthod* 2003;4:197–205.
9. Frost HM. The regional acceleratory phenomena: A review. *Henry Ford Hosp Med J* 1983;31:3–9.
10. Frost HM. The biology of fracture healing. An overview for clinicians. Part I. *Clin Orthop Relat Res* 1989;248:283–293.
11. Frost HM. The biology of fracture healing. An overview for clinicians. Part II. *Clin Orthop Relat Res* 1989;248:294–309.
12. Bogosh E, Gschwend N, Rahn B, Moran E, Perren S. Healing of cancellous bone osteotomy in rabbits—Part I: Regulation of bone volume and the regional acceleratory phenomenon in normal bone. *J Orthop Res* 1993;11:285–291.
13. Vercellotti T, Podesta A. Orthodontic microsurgery: A new surgically guided technique for dental movement. *Int J Periodontics Restorative Dent* 2007;27:325–331.
14. Lee W. Corticotomy for orthodontic tooth movement. *J Korean Assoc Oral Maxillofac Surg.* 2018 Dec;44(6):251-258.

15. Alikhani M, Raptis M, Zoldan B, Sangsuwon C, Lee YB, Alyami B, et al. Effect of micro-osteoperforations. Authors' response. *Am J Orthod Dentofacial Orthop.* 2014;145:273–274.
16. Prasad S, Ravindran S. Effect of micro-osteoperforations. *Am J Orthod Dentofacial Orthop.* 2014;145:273.
17. Buyuk SK, Yavuz MC, Genc E, Sunar O. A novel method to accelerate orthodontic tooth movement. *Saudi Med J.* 2018;39:203–208.