

Evaluation of Time Required among Cleft Alveolus Patients versus Normal Patients for the Orthodontic Treatment- An Original Research

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Abstract

Introduction: Orthodontic treatment is usually perceived as a lengthy treatment as average treatment time usually last more than a year and may go up to even five years. So, in orthodontic practice the optimum treatment result with minimal treatment time should be the goal of clinicians. Treatment duration varies based on different clinico-environmental factors. Hence in this study we aim to evaluate the time required for the orthodontic treatment for the routine malocclusion and the cleft alveolus patients.

Materials & Method: Total 100 cases were randomly selected from the archives of debonded treatment records from the department of orthodontics. The selected cases were equally divided into four different groups: Class I, II, III, Cleft Alveolus. Time required for the completion of the treatment among the four groups was compared. The values were compared using the ANOVA and P value ≤ 0.05 was taken significant.

Result: Out of the 100 selected cases. There was no statistical significance on treatment duration among male and female subjects ($p= 0.933$). On the contrary, there was statistical difference on treatment duration among the four groups with the maximum time taken for the class II cases ($p=0.001$). The average treatment duration for were Class I, II, III, Cleft Alveolus 22, 35, 27 and 29 months respectively.

Conclusion: Orthodontic treatment duration is shorter for class I than other malocclusion. There are significant differences in treatment times for the cleft alveolus and other normal malocclusions. There is no significant difference between the cleft alveolus and the normal malocclusions. The treatment duration is not affected by gender and type of malocclusion.

Keywords: Malocclusion, Cleft Alveolus, Orthodontic, Treatment duration.

Introduction

Orthodontic treatment is usually seen as an extensive and painful procedure by patients. It is a fact that the result should be optimum at the least amount of time possible. Nevertheless the treatment duration is influenced by upon other variables like extractions, age, type and severity of malocclusion, skeletal versus dental problem, method applied, surgical versus non surgical procedures.¹⁻⁶ Conferring to the recently systemic review, routine comprehensive orthodontic treatment duration with fixed orthodontic therapy range from 14-33 months with the average duration of 19 months.⁸ In some studies the duration of 18-24 months on average with some treatment lasting even 48 months.^{9,10} In a recently randomized control trial has established that even though bracket slot does not affect the treatment duration but the missed appointment and emergencies, age of the patient and multi operator treatment increases the treatment duration.¹¹ Every orthodontist should wish at completing the case at the shortest duration possible. The longer treatment duration is disadvantageous for the reputation of the orthodontist. It is financially and psychologically draining to both the patient and the doctor. The most prevalent malocclusion globally is Class I followed by Class II.¹² Since the invention of secondary alveolar bone grafting (SABG) in 1972 (Boyne and Sands, 1972), this strategy has become the standard treatment for reestablishing the alveolar cleft in most cleft centers.⁴ Presurgical orthodontics assumes a significant part in correcting misaligned central incisors or repositioning displaced maxillary alveolar segments, which are normal findings in the cleft maxilla. Presurgical orthodontics permits the specialist better access for placement of the graft and closure of the soft tissue. Also, higher grafting success was found in cases of pre SABG orthodontic space closure than in without orthodontic treatment, recommending the influence of postsurgical orthodontics.⁵ Hence in this study we aim to evaluate the time required for the orthodontic treatment for the routine malocclusion and the cleft alveolus patients.

Materials and methods

This was the retrospective observational study in which total 100 cases were randomly selected from the archives of debonded treatment records from the department of orthodontics, after obtaining approval from Institutional review committee. Patients with good records were included in the study whereas cases treated for impacted teeth, incomplete records, retreatment, were excluded from the study. The selected cases were equally divided into four different groups: Class I, II, III, Cleft Alveolus. ANOVA test were performed to compare the treatment duration with respect to gender, malocclusion pattern and treatment modalities. P value ≤ 0.05 was taken significant.

Results

The descriptive statistics on distribution of gender and malocclusion pattern is shown in table 1 and 2. There is no statistical difference on treatment duration among male and female subjects as well as types of malocclusion and the cleft alveolus types. The descriptive statistics and comparison of treatment duration among different treatment modalities are explained in Table 3. There is significant difference on treatment duration among non-extraction, partial extraction and extraction group. The mean duration of treatment with is Class I, II, III, Cleft Alveolus 22, 35, 27 and 29 months respectively. Further post hoc analysis shows that treatment duration showed significantly difference in various groups.

Table 1: Duration of orthodontic treatment among different malocclusions.

Malocclusion	N	Mean	S.D.	p-value
Class I	25	22	7.08	0.001*
Class II	25	35	8.79	
Class III	25	27	7.34	
Cleft alveolus	25	29	7.89	

Table 2: Duration of orthodontic treatment among gender

Gender	N	Mean	S.D.	p-value
Male	38	25.25	7.21	0.933
Female	62	25.39	8.40	

Table 3: Comparison of the Duration of orthodontic treatment among groups.

Treatment modality		Mean difference	p-value
Class I	Class II	-5.36	0.022*
	Class III	-6.52	0.01*
	Cleft Alveolus	-6.52	0.01*
Class II	Class I	5.36	0.022*
	Class III	-1.16	0.04*
	Cleft Alveolus	-6.52	0.01*
Class III	Class I	6.52	0.01*
	Class II	1.16	0.04*
	Cleft alveolus	-6.52	0.01*
Cleft alveolus	Class I	-6.52	0.01*
	Class II	1.16	0.05*
	Class III	-6.52	0.01*

Discussion

The length of orthodontic treatment is always a critical factor. It is advantageous to finish the treatment in shortest possible duration. The time taken for comprehensive orthodontic treatment is multifactorial. The average treatment duration in our study is Class I, II, III, Cleft Alveolus 22, 35, 27 and 29 months respectively. The previous study done in Nepal has shown the average treatment time of 28 months and 30 months for adults and adolescents respectively however they have not divided the duration. The study done by Fink et al has shown the average treatment duration of orthodontic treatment of 23 months ranging from 19 to 27 months which is less than that of our study.⁹ A recent systematic review has also shown the average treatment duration of fixed orthodontic therapy is 18 months.⁹ The duration of orthodontic treatment depends upon the severity and type of malocclusion, appointment adherence and compliance of the patient, treatment mechanics applied etc.^{1,2,18} In the patients with cleft palate and alveolus the second strongest independent factor in our multivariate analysis for the association of SABG with the 3D outcome of oral cleft defect was pre-surgical orthodontic treatment, in contrast to previous results (Long et al., 1995).¹¹ The socioeconomic and psychological factors are also found to be associated with orthodontic treatment duration. Higher parental involvement in treatment is found to have shortened the treatment duration.²⁴ Fink and Smith⁹ found a significant association between treatment variables and treatment time. O'Brien et al¹⁰ found that extractions in Class II/1 patients resulted in longer treatment time. According to our study, class I treatment takes relatively shorter duration than that of cleft alveolus which is similar to other studies as well.^{7,25} Shia¹² who investigated 500 treated cases to identify the factors accountable for treatment overruns and found that broken appointments, appliance breakage, and poor patient cooperation were the primary affecting treatment time. The only factors associated with the oral cleft defect in our multivariate analysis were orthodontic treatments before and after SABG. Our finding on surgical orthodontic treatment is consistent with a report suggesting that orthodontic space closure after grafting is linked to a lower level of graft resorption than orthodontic space openings (Schultze-Mosgau et al., 2003).⁵ Similarly, pre- or postsurgical orthodontic treatment was independently associated with lower need for revision after bone grafting. Thus, post-SABG orthodontic movement of cleft-adjacent teeth can apply functional stress on the grafted bone and promote alveolar remodeling.¹³

The future of orthodontic lies on lowering the treatment duration without compromising the result. For that number of new techniques and methods such as corticotomies, laser therapy, bracket modification as well as application of vibration have been proposed and tried but the effectiveness of these methods are still controversial.^{6,18,19,27} Despite all the factors, patient's inherent biological response to force, type and severity of malocclusion and compliance of the patient should also be considered seriously.

Conclusion

Orthodontic treatment duration is shorter for class I than any other malocclusion. There is significant variation in the treatment times rather where the cleft alveolus needs an average of 29 months. The average treatment duration for Class I, II, III, are 22, 35, 27 months respectively. The treatment duration is not affected by gender and type of malocclusion.

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