

A Clinical Trial to Assess Effect on Periodontal Health Due to Orthodontic Treatment

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ABSTRACT

Background: To evaluate the effect of fixed orthodontic treatment on periodontal parameters in periodontally compromised adult orthodontic patients.

Materials and Methods: This was a prospective, randomized, controlled clinical trial. 50 periodontally compromised adult patients were randomly allocated to either test (perio-ortho) or control group (perio). After periodontal stabilization in both groups, orthodontic treatment was started in the test group, whereas the control group remained on periodontal maintenance only. Evaluation and comparison of clinical parameters (plaque index [PI]; gingival index [GI]; bleeding on probing [BOP]; probing depth [PD]; clinical attachment level [CAL]) of both groups was assessed at three time intervals: T0 (base line), T1 (at start of orthodontic treatment), and T2 (1 year after start of orthodontic treatment). Radiological parameters (alveolar bone levels [ABL]) were recorded using CBCT at T1 and T2.

Results: Intragroup analysis showed statistically significant improvement in all clinical and radiological periodontal parameters in both groups ($P .05$). Intergroup comparison revealed improvement in the periodontal parameters was not statistically significant between the groups ($P .05$). Subgroup analysis showed reduction in the number of moderate and severe periodontitis sites in both groups with significant more gains in ABL in the test group compared to the control group. Conclusions: Orthodontic treatment after periodontal stabilization does not have any detrimental effect on periodontal health in adult periodontally compromised orthodontic patients and may add to the benefits achieved by periodontal treatment alone.

Keywords: Fixed Orthodontics Periodontitis; Orthodontic treatment; Cone-beam computed tomography; Clinical attachment level.

INTRODUCTION

Orthodontic problems in the majority of these adult patients are a consequence of their underlying periodontal issues leading to reduced periodontal support and resulting in pathological migration, proclination of maxillary anterior teeth, interdental spacing, rotation and overeruption, resulting in

compromised function and esthetics. Unfortunately there is no evidence-based solution to these problems and, with an increasing number of adults with malocclusion and compromised periodontium seeking orthodontic treatment, it is important to clarify the various issues involved in managing

Received: Jan. 8, 2021: Accepted: Mar. 13, 2021

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periodontally compromised dentitions. Orthodontic treatment in periodontally involved patients has been reported in a few clinical studies and case reports. 1-5 The present study was undertaken to study the effect of fixed orthodontic treatment on clinical and radiological periodontal parameters in periodontally compromised patients. 6-19 is the first randomized controlled study evaluating the effect of orthodontic treatment on periodontal health in periodontally compromised patients compared with a closely matched control group managed only by periodontal treatment.

MATERIALS AND METHODS

This was a prospective, randomized, controlled clinical study conducted in Dhanbad. All 50 patients received a detailed periodontal evaluation and parameters were recorded at T0. After periodontal stabilization, block randomization was achieved by an investigator (DK) not involved in providing orthodontic or periodontal treatment or analyzing results. A block size of 6 was chosen and possible balanced combinations with three tests and three controls were generated by using random allocation software.¹⁰ Further random selection of blocks was done for assignment of all 40 participants. Clinicians and patients were not blinded due to the research design. However, the person analyzing the data was blinded, as all patients and their data were numbered consecutively. The Test Group i.e. 25 Patients receiving orthodontic treatment after treatment of periodontitis. The Control Group i.e. 25 Patients. Patients managed by achieving and maintaining stable periodontal health for the study duration. These patients were given the option of starting orthodontic treatment after 1 year.

Periodontal Management

Professional periodontal treatment was provided to all patients in both groups as per their requirements, including professional oral hygiene (POH) and periodontal surgery in the form of open-flap debridement in sites showing probing depths (PD) 5 mm that bled on probing even after scaling and root planing at the 4 to 6 week follow-up visit. All patients were prescribed 0.12% chlorhexidine mouth rinse twice daily for 2 weeks after surgery.

Orthodontic Treatment

Orthodontic treatment was started in the test group using preadjusted edgewise 0.022-in. MBT brackets (Ortho Organizers, Carlsbad, CA, USA) bonded with Enlight Light Cure Adhesive (Ormco Corp, Glendora, CA, USA) using an LED curing light (Galaxy, Light Cure Unit Cordless, Ahmedabad, India). Special considerations concerning force systems, anchorage, and retention were applied during orthodontic treatment¹¹

RESULTS

All 50 patients completed the trial, and healing was uneventful in all patients. Results shows that there were no statistically significant differences at baseline in demographic, clinical, or radiological parameters between the two groups. The mean values and change in various clinical periodontal parameters in the test and control groups before (T0) and after (T2) treatment. There was a statistically significant improvement ($P \leq .05$) in all clinical periodontal parameters in both the groups at all-time intervals with no significant differences between the groups. improvement from T1 to T2 in both groups. The mean ABL for test patients at T1 was 3.42 mm 61.01 mm and at T2 was 2.94 mm 1.0 mm. Mean ABL at T1 for the control group was 3.40 mm 1.0 mm and at T2 was 3.05 mm 1.03 mm, resulting in a bone gain of 0.48 in the test group and 0.35 in the control group. The number of sites in the mild, moderate, and severe categories of CAL, PD, and ABL were evaluated and a change in the frequencies of the three subgroups in the test and control groups was seen. In subgroup analysis for PD, there was a reduction in 99% of severe and 66% of moderate periodontitis sites and an increase of 42% in mild sites in the test group. A reduction in 97% of severe and 62% of moderate sites with an increase of 38% in mild sites in the control group was found. CAL subgroup analysis showed a reduction in 71% of severe and 53% of moderate CAL sites in the test group with an increase of 55% in mild sites in the test group, while the control group showed a reduction in 54% of severe and 51% of moderate sites with an increase of 38% in mild sites. Again, the difference in the reduction of PD and CAL sites was not statistically significant between the groups ($P \leq .05$). Subgroup analysis of ABL sites showed a similar trend of reduction in the number of severe and moderate bone sites and an increase in the number of mild sites in both groups as seen in Table 1. However, the improvement in

Table 1: Intergroup Comparisons of Change in Frequency and Distribution of PD (T0-T2), CAL (T0-T2), and ABL (T1-T2) Sites Between Test and Control Groups in the Time Intervals Specified.

Periodontitis Sites	Test Group (25 Cases)			Control Group (25 Cases)			
	Mild	Moderate	Severe	Mild	Moderate	Severe	P *** Value
PD total sites T0	65.7%	29.3%	8.95%	64.5%	27.6%	7.79%	.570
PD total sites T2	90.6%	9.25%	0.07%	89.4%	10.3%	0.10%	.168
Change PD T0-T2	42%	66%	99%	38%	62%	97%	.982
CAL total sites T0	51.4%	34.3%	14.1%	52.4%	34.8%	12.6%	.534
CAL total sites T2	79.8%	16.1%	4%	77.2%	17.5%	5.7%	.088
Change CAL T0-T2	55%	53%	71%	38%	59%	54%	.090
ABL total sites T1	21.1%	50.9%	27.8%	23%	42.5%	27.4%	.647
ABL total sites T2	29.5%	46.9%	23.4%	27.5%	48.4%	23.9%	.660
Change ABL T1-T2	41 %	11%	9 %	23 %	4 %	15 %	.004

ABL periodontitis sites was significantly ($P = .004$) greater in the test group than the control group. periodontal parameters in periodontally compromised patients. This study attempted to address whether it is safe to subject periodontitis patients to orthodontic therapy.

DISCUSSION

The fact that orthodontic treatment has been shown to have small detrimental effects on the periodontium even in periodontally healthy individuals is a cause of concern, especially in an already compromised dentition.¹⁴ The results of the study showed favorable results of a combined periodontic-orthodontic treatment in periodontally compromised patients. There was a statistically significant improvement in all the periodontal parameters in the control and test groups with a highly significant CAL gain of 0.74 mm (CI: 0.64-0.83) and 0.98 mm (CI: 0.94-1.01), respectively, from T0-T2. Use of CBCT enabled evaluation of ABL changes on all four surfaces of upper and lower anterior teeth and showed statistically significant improvement in ABL from T1 to T2 in both groups. Vardimon et al. hypothesized that bone repair could be due to orthodontic treatment acting as a mechanical stimulus.¹⁸ Ogihara et al.¹⁹ reported that mechanical stresses exerted on the alveolar bone led to activation of angiogenic growth factors like vascular endothelial growth factor, by which angiogenesis led to osteogenesis during bone formation and remodeling. The present trial provided an evidence-based conclusive answer that orthodontic treatment had no detrimental effect on the periodontal health in periodontally compromised patients if proper periodontal health

was maintained throughout orthodontic treatment. Further studies with larger power, greater sample sizes, long-term follow-up, and exploring other aspects involved in routine treatment of adult orthodontic patients, are recommended to verify these results. Hence, a long-term follow-up of the results is being continued for this study too.

CONCLUSION

Within the limitations of the study, it can be concluded that orthodontic treatment does not have a deleterious effect on periodontal health after periodontal stabilization in periodontally compromised patients.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interest regarding this article.

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