

Examining the Relationship Between Periodontal Disease in 60 Individuals and the use of Fixed Orthodontic Appliances

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Abstract

Periodontal lesions and gum inflammation, which are common in both children and adults and have symptoms including bleeding gums and an increase in gum volume, are one of the society's biggest issues and concerns. This study was carried out in light of the existing ambiguities regarding the relationship between the use of fixed orthodontic appliances and the development of periodontal disease, as well as the known complications of periodontal disease, the etiological significance of the disease, and the existence of the disease. A historical cohort study was done on 60 girls in the same school and class who were the control group and 30 girls receiving fixed orthodontic treatment for at least 12 months. The aforementioned participants had no trauma, the control group had never received orthodontic treatment, and both groups' ages and sexes were comparable.

Keyword: Orthodontic; Oral hygiene; Case study; Etiological significance; Periodontal

Introduction

Adult patients' need for orthodontic care has been seen to increase recently. Aesthetics are crucial to adult patients when considering treatment for sociocultural reasons [1]. Over the past 30 years, fixed lingual bracket systems have been created to offer orthodontic treatment that is virtually undetectable. There have been complaints that these prefabricated lingual bracket systems lead to issues such as mouth pain, speech impairment, and mastication restriction. The majority of lingual appliance issues have been resolved in modern times because of computerized archwire production and tailored brackets [2,3]. Since not all patients are willing to undertake surgical treatment, an orthodontic camouflage with unilateral extraction is an effective alternative. The element to be extracted on the opposite side is chosen based on mechanical, cosmetic, and functional considerations [4,5]. For the greatest esthetic and functional outcome, restorative dental treatment with either build-ups or veneers at treatment end is required. The two viable treatment options are represented by either lateral incisor extraction or one premolar extraction [6,7]. The need for adult orthodontic treatment is rising, and lingual fixed appliances are becoming more and more well-liked [8,9]. Despite the clear aesthetic benefits of these systems, some orthodontists have been reluctant to recommend lingual-based treatment to their patients. This is frequently predicated on the perceived issues with lingual braces, which relate to patient discomfort and speech challenges as well as orthodontist difficulty using these appliances [10,11].

Despite some of these characteristics having been looked into, the evidence base is still lacking, partly as a result of the fact that these appliance systems are still developing [12].

Although the onset can be earlier with lingual brackets and the location is different, with the tongue more frequently implicated [13], pain and discomfort for the patient seem to be similar following the installation of labial or lingual appliances, according to research done to date [2,14]. Pre-fabricated lingual brackets may cause more pain than customized ones. Additionally, when wearing a lingual device, patients do appear to be more likely to struggle with speaking and mastication [15]. The lingual surfaces of the teeth may be more resistant to early demineralization and caries, according to some research. There is little information available about the effectiveness of therapy and how simple it is for the orthodontist to employ lingual or labial appliances, or alternative lingual systems [16]. The effectiveness of lingual appliance systems, for both the patient and the orthodontist, has to be investigated further [17].

Study Design

The study was planned as a parallel trial with two sets of patients who were seen in succession. Between February and May 2022, evaluations of the lingual patients were conducted.

Materials and Methods

At three successive control visits, the periodontal health of thirty patients each wearing aligners or fixed lingual appliances was inspected. Patients from the Department of Orthodontics and Dentofacial Orthopedics at the Charité Berlin comprised all of the Invisalign patients as well as some of those wearing lingual appliances. The remaining individuals were sourced from the offices of two certified orthodontists.

nQuery Advisor 5.0 was used to calculate power and sample sizes (Statistical Solutions, Saugus, Massachusetts, USA). According to power calculations, a sample size of 25 would have a 90% chance of detecting a difference in means of 25%, assuming that the differences' Standard Deviation (SD) was 25%. Throughout the trial, there were no dropouts noted [18]. The modified Gingiva, modified Plaque, and modified Papillary Bleeding Indexes were used to assess the periodontal health of the patients [19]. The sulcus probing depth was also determined. From the central incisor to the first molar, all indices were recorded lingually in the second and fourth quadrants and buccally in the first and third. Each quadrant's first molar and first premolar had its sulcus probing depth assessed mesially, distally, buccally, and lingually. Following each control visit, specific, one-on-one oral hygiene instructions were given.

Results and Discussion

With regard to the reproducibility of clinical measurements, the empirical SD for PPD was 0.01 ± 0.01 mm, indicating excellent reproducibility. The results of the clinical examination was 12.4 ± 8.2 per cent at T_0 and 14.3 ± 8.1 per cent at T_1 . PPD at the buccal sites remained mostly unchanged at 2.1 ± 0.3 mm at T_0 and 2.1 ± 0.2 mm at T_1 , whereas PI was 0.1 ± 0.2 at T_0 and T_1 . At the lingual sites, BOP was 22.2 ± 19.0 per cent at T_0 and 56.2 ± 31.6 per cent at

T_1 . PPD increased from 2.3 ± 0.3 mm at T_0 to 2.9 ± 0.3 mm at T_1 at the lingual sites, whereas PI was 0.1 ± 0.2 at T_0 and 1.2 ± 1.1 at T_1 . The difference between T_0 and T_1 was statistically significant for all clinical parameters at the lingual sites ($P < 0.05$).

By promoting plaque formation during treatment with fixed buccal orthodontic appliances, which is linked to a worsening of clinical indicators like BOP and PPD, oral health is compromised. However, there have been no studies done to see if individuals receiving fixed, specially constructed lingual orthodontic appliances exhibit the same clinical outcomes [20]. The same physician at T_0 and T_1 examined all patients in order to prevent inter-observer variations in gathering clinical parameters in the current investigation. To guarantee that periodontal and microbiological parameters increased as much as possible, the experiment was carried out during a defined period of three months. Six exemplary index teeth's clinical parameters were identified. The outcomes of such a test are often equivalent to those of a comprehensive periodontal test. The first and third or second and fourth quadrants were randomly chosen for clinical examination, which allowed for the evaluation of confounders such preference for unilateral dental hygiene [6].

Conclusion

Even though the entire mouth, including the keratinized gingiva, is covered for almost the entire day while using Invisalign®, the periodontal risk is lower than when using fixed lingual appliances. This might be as a result of the detachable nature of aligners, which allows for unhindered dental hygiene. In contrast, when using a fixed appliance, the lingual tooth surfaces are exceedingly challenging to clean.

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