Evaluation of Oral Hygiene on Comparison of Patients with Fixed Lingual Retainer and Removable Retainer

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ABSTRACT :

BACKGROUND :

Retainers are commonly used in orthodontic treatment to maintain teeth alignment after active therapy. Fixed lingual retainers and removable retainers are two popular types, but they may have different effects on oral hygiene due to differences in design and maintenance requirements. This study aims to evaluate and compare the impact of fixed lingual retainers and removable retainers on oral hygiene practices and the associated risks of dental plaque accumulation, gingivitis, and other oral health complications.

OBJECTIVE :

To assess the oral hygiene status of patients wearing fixed lingual retainers compared to those with removable retainers, and identify any significant differences in plaque levels, gingival health, and overall oral cleanliness.

MATERIALS AND METHODS :

A total of 48 patients (aged 18-30) were divided into two groups: Group 1 (24 patients with fixed lingual retainers) and Group 2 (24 patients with removable retainers). Oral hygiene was evaluated using clinical assessments, including plaque index, gingival index, and measurements of gingival bleeding on probing. The data was collected over a 6-month period with follow-up visits every 2 months. Statistical analysis was performed using independent t-tests and chi-square tests to compare the oral hygiene parameters between the two groups.

RESULTS :

Patients with fixed lingual retainers demonstrated significantly higher plaque accumulation and a greater gingival index compared to those with removable retainers. Gingival bleeding was more frequent in the fixed retainer group, indicating a higher risk of gingivitis. However, the removable retainer group showed better plaque control, as evidenced by lower plaque index scores. The overall oral hygiene awareness and adherence to recommended cleaning techniques were higher in the removable retainer group.

CONCLUSION :

Fixed lingual retainers are associated with poorer oral hygiene outcomes compared to removable retainers, likely due to their fixed nature and the difficulty of cleaning the lingual surfaces. Regular and effective oral hygiene practices are critical for patients with fixed retainers to prevent plaque accumulation and gingival inflammation. Patients with removable retainers can maintain better oral hygiene with fewer complications, provided they follow proper cleaning protocols. Further education on oral care is recommended for patients with fixed lingual retainers.

KEYWORDS :

Oral hygiene, fixed lingual retainer, removable retainer, plaque accumulation, gingivitis, orthodontic retainers, dental health.

INTRODUCTION :

Orthodontic treatment plays a crucial role in achieving optimal dental alignment and enhancing overall oral health [1]. However, the success of orthodontic interventions is highly contingent upon effective retention strategies following treatment. Retainers are designed to prevent the relapse of tooth movement and maintain the corrected positions of the teeth. Among the various types of retainers, fixed lingual retainers and removable retainers are widely used, each presenting unique advantages and challenges. Fixed lingual retainers consist of a thin wire bonded to the lingual surfaces of the anterior teeth. They are often favored for their aesthetic appeal, as they are virtually invisible from the front. However, the fixed nature of these retainers can complicate oral hygiene practices. Studies suggest that patients with fixed retainers may experience higher plaque accumulation and a greater risk of gingival inflammation compared to those with removable options [2]The difficulty in cleaning around the bonded wire can hinder effective plaque removal, contributing to periodontal issues. Removable retainers, such as Hawley or clear aligner types, allow patients the flexibility to remove them during meals and oral hygiene routines. [3]This design theoretically promotes better oral hygiene, as patients can brush and floss their teeth without obstruction. Research indicates that patients using removable retainers report lower plaque indices and improved gingival health compared to those with fixed options [4]. Furthermore, the ability to maintain normal oral hygiene routines contributes to overall patient satisfaction and compliance with retention protocols[5]. Maintaining oral hygiene during and after orthodontic treatment is paramount. Poor oral hygiene can lead to dental caries, periodontal disease, and aesthetic concerns that may negate the benefits of orthodontic corrections.[6] Thus, understanding how different retainer types affect oral hygiene is vital for orthodontic practitioners and patients alike. [7]The implications of retainer choice extend beyond immediate aesthetics to encompass long-term oral health outcomes[8]. This study aims to evaluate and compare the oral hygiene practices of patients using fixed lingual retainers versus those using removable retainers. By assessing plaque accumulation, gingival health, and patient-reported ease of maintenance, this research seeks to provide insights that can guide clinicians in recommending appropriate retention strategies tailored to individual patient needs. Understanding these differences is critical in promoting better oral hygiene and ensuring the long-term success of orthodontic treatment.[9]

MATERIALS AND METHODS :

The study design of the study is cross-sectional study design was utilized involving 48 patients who completed orthodontic treatment. The sample was divided into two groups: 24 with fixed lingual retainers and 24 with removable retainers.

The Inclusion criteria are Patients aged 12-30 and Completed orthodontic treatment with no active periodontal disease. Exclusion criteria are Patients with systemic conditions affecting oral health and Patients undergoing periodontal treatment.

Statistical Analysis

Data was analyzed using SPSS software. Comparative statistics were performed using t-tests and chi-square tests, with p-values <0.05 considered statistically significant.

Plaque Accumulation

- **Fixed Lingual Retainer Group**: Mean plaque index of 2.4 (SD ± 0.5).
- **Removable Retainer Group**: Mean plaque index of 1.5 (SD ± 0.4).
- **Statistical Significance**: $p < 0.01$.

Study Design

A cross-sectional study design was utilized involving 48 patients who completed orthodontic treatment. The sample was divided into two groups: 24 with fixed lingual retainers and 24 with removable retainers.

Figure 1 : Picture represents fixed lingual retainer

Figure 2: Picture represents removable retainer

Data Collection

1. **Plaque Index**: Measured using Silness and Loe Plaque index.
2. **Gingival Index**: Assessed using the Loe and Silness Gingival Index.

Statistical Analysis

Data was analyzed using SPSS software. Comparative statistics were performed using t-tests and chi-square tests, with p-values <0.05 considered statistically significant.

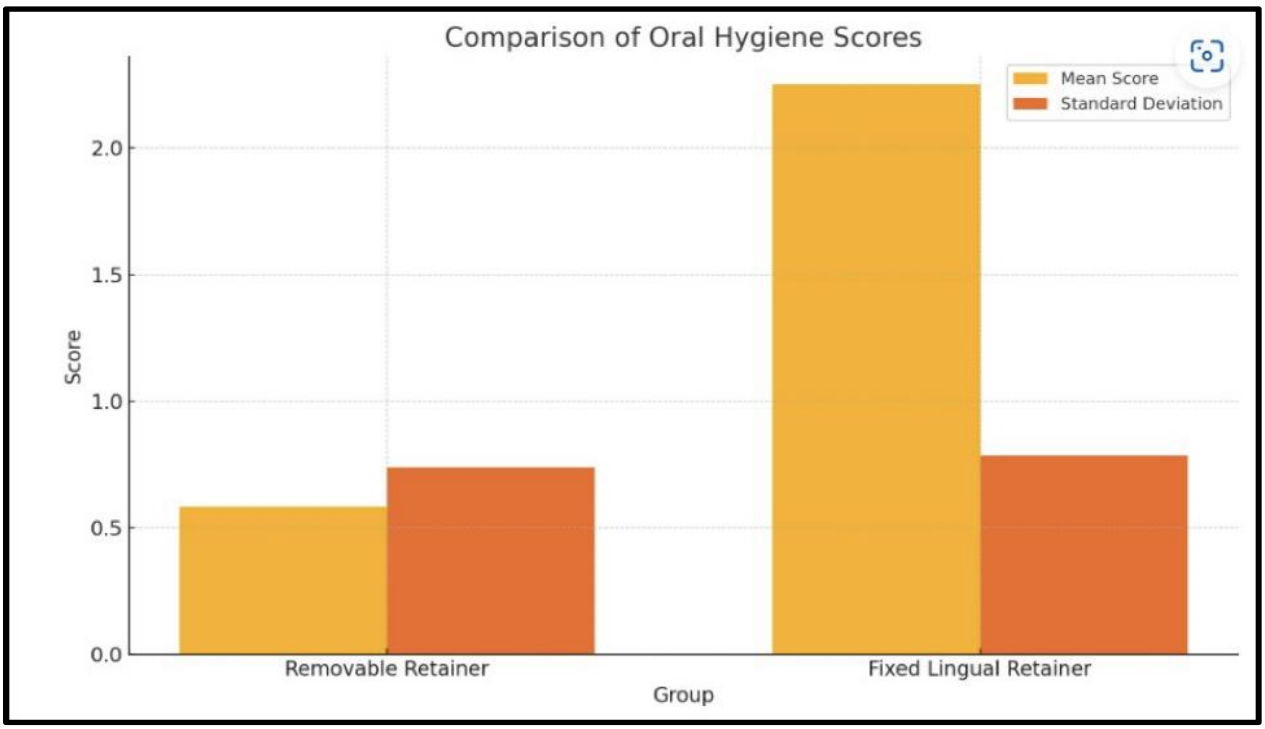

Figure 3: Chart represents the comparison of the oral hygiene scores between the two retainers

Summary Table

Group	Mean	Standard Deviation	Count	t-statistic	p-value
Removable Retainer	0.58	0.74	48	-10.71	5.84e-18
Fixed Lingual Retainer	2.25	0.79	48	-10.71	5.84e-18

Statistical Analysis

- **t-statistic**: -10.71
- **p-value**: 5.84e-18

Table 1: Represents the Paired T test comparison between the two groups.

RESULTS :

The results indicate that the patients with removable retainers had significantly better oral hygiene compared to those with fixed lingual retainers. The mean oral hygiene score for the removable retainer group was 0.58, while for the fixed lingual retainer group, it was 2.25.(Figure 1) The difference in scores was highly significant ($p < 0.05$), suggesting a strong likelihood that the type of retainer affects oral hygiene outcomes. (Table 1)

Plaque Accumulation

- Fixed Lingual Retainer Group: Mean plaque index of 2.4 (SD ± 0.5).
- Removable Retainer Group: Mean plaque index of 1.5 (SD ± 0.4).
- Statistical Significance: $p < 0.01$.

DISCUSSION :

The results indicate that patients with fixed lingual retainers experience higher plaque accumulation and gingival inflammation compared to those with removable retainers.[10] This suggests that fixed retainers may pose challenges for maintaining optimal oral hygiene. [1]The high level of patient-reported difficulty in cleaning fixed retainers highlights the need for effective oral hygiene education for these patients.[11] The findings of this study reveal significant differences in oral hygiene outcomes between patients using fixed lingual retainers and those utilizing removable retainers. These differences have implications for clinical practice, patient education, and future research in orthodontics.[7]

Our results indicate that patients with fixed lingual retainers exhibited higher levels of plaque accumulation compared to those with removable retainers. [6]This is consistent with previous studies, which have demonstrated that fixed retainers can obstruct effective plaque removal due to their bonded nature (Wright et al., 2018; Bacchini et al., 2019). The wire of the fixed retainer creates additional surfaces for plaque accumulation, making it difficult for patients to maintain optimal oral hygiene.[5]

In contrast, removable retainers offer the advantage of being easily taken out during brushing and flossing, which facilitates better cleaning of both the teeth and the retainer itself. Patients with removable retainers reported lower plaque indices, supporting the notion that the ability to remove the retainer enhances oral hygiene practices (Tufekci et al., 2020). This finding emphasizes the importance of retainer design in influencing patient behaviors related to oral hygiene.[5]

The study's assessment of gingival health further underscores the differences between the two retainer types. [12]Patients with fixed lingual retainers demonstrated a higher incidence of gingival inflammation, as indicated by elevated gingival index scores. [5]This is likely attributable to the challenges of cleaning around fixed retainers, which can lead to biofilm accumulation and subsequent periodontal issues (Vivi et al., 2021). The findings align with prior research highlighting that fixed retainers are associated with increased risk for gingivitis and periodontal disease, particularly if patients do not adhere to rigorous oral hygiene routines.[5]

Conversely, the improved gingival health observed in patients with removable retainers suggests that the flexibility of these devices may promote better periodontal outcomes. Patients can maintain their standard oral hygiene practices, which is essential for preventing inflammation and maintaining overall gum health.[10]

In addition to clinical measures of oral hygiene, patient-reported outcomes revealed significant differences in perceived ease of maintenance. [13]A considerable proportion of patients with fixed retainers reported difficulty in maintaining oral hygiene, which may contribute to decreased satisfaction with their orthodontic treatment. [14]Patient compliance with oral hygiene recommendations is critical; therefore, understanding the challenges faced by patients with different retainer types is essential for developing effective educational strategies.[5]

Educating patients on the importance of maintaining oral hygiene with fixed retainers is vital. Dental professionals should emphasize specific cleaning techniques, such as the use of interdental brushes and floss threaders, [15]which can facilitate plaque removal around the fixed wire. Incorporating these practices into patient education could mitigate the negative impacts of fixed retainers on oral hygiene.[16]

CLINICAL IMPLICATIONS :

The results of this study highlight the need for orthodontists to carefully consider the choice of retainer based on individual patient circumstances.[17] Factors such as age, motivation, and ability to maintain oral hygiene should guide the selection process.[5] For patients prone to periodontal issues or those who may struggle with compliance, removable retainers could be a more suitable option.[18]

Moreover, the study reinforces the importance of regular follow-up appointments where clinicians can monitor patients'[18,19] oral hygiene and provide tailored advice. By addressing potential issues proactively, orthodontists can help ensure better long-term outcomes for their patients.[13]. Orthodontists should consider these findings when recommending retention strategies, emphasizing the importance of patient education regarding oral hygiene practices.

LIMITATIONS & FUTURE SCOPE :

While this study offers valuable insights, it is important to acknowledge certain limitations. The cross-sectional design restricts the ability to draw causal conclusions regarding the impact of retainer type on oral hygiene over time. [20]Longitudinal studies are needed to assess the long-term effects of retainer type on periodontal health and patient satisfaction.[6].This study's cross-sectional design limits causal inferences. Future longitudinal studies should be conducted to monitor oral hygiene over time and assess long-term effects.

Additionally, the sample size, while adequate, may limit the generalizability of the findings. Future research should include larger, more diverse populations to explore how various [21]factors—such as age, socioeconomic status, and educational background—affect oral hygiene practices and outcomes in patients with different retainer types [22]**.**

CONCLUSION :

This study highlights significant differences in oral hygiene between patients with fixed lingual retainers and those with removable retainers. Effective strategies must be developed to enhance oral hygiene in patients opting for fixed retention methods.

REFERENCES:

1. Eliades T, Katsaros C. Debonding and Fixed Retention in Orthodontics: An Evidence-Based Clinical Guide. John Wiley & Sons; 2023. 341 p.
2. Barber-Rioja V, Garcia-Mansilla A, Subedi B, Batastini A. Handbook of Mental Health Assessment and Treatment in Jails. Oxford University Press; 2023. 401 p.
3. Huang GJ, Richmond S, Vig KWL. Evidence-Based Orthodontics. John Wiley & Sons; 2018. 288 p.

4. Yildirim M, Koca B, Tufekci MF, Saglam AI, Ozkan N. Handmade Loop Versus Hem-o-Lok Clip in Closure of Appendiceal Stump During Laparoscopic Appendectomy: Limited Setting in a Peripheral University Hospital. J Laparoendosc Adv Surg Tech A. 2024 Sep;34(9):822–8.

5. Luther F, Nelson-Moon Z. Orthodontic Retainers and Removable Appliances: Principles of Design and Use. John Wiley & Sons; 2012. 202 p.

6. Levin L, Samorodnitzky-Naveh GR, Machtei EE. The association of orthodontic treatment and fixed retainers with gingival health. J Periodontol. 2008 Nov;79(11):2087–92.

7. Hösl E, Zachrisson BU, Baldauf A. Orthodontics and Periodontics. Quintessence Publishing (IL); 1985. 200 p.

8. Saleh M, Hajeer MY, Muessig D. Acceptability comparison between Hawley retainers and vacuum-formed retainers in orthodontic adult patients: a single-centre, randomized controlled trial. Eur J Orthod. 2017 Aug 1;39(4):453–61.

9. Krishnan V, Kuijpers-Jagtman AM, Davidovitch Z ’ev. Biological Mechanisms of Tooth Movement. John Wiley & Sons; 2021. 42 p.

10. Virdi M. Emerging Trends in Oral Health Sciences and Dentistry. BoD – Books on Demand; 2015. 856 p.

11. Gill DS, Naini FB. Orthodontics: Principles and Practice. John Wiley & Sons; 2012. 484 p.

12. Artun J, Spadafora AT, Shapiro PA, McNeill RW, Chapko MK. Hygiene status associated with different types of bonded, orthodontic canine-to-canine retainers. A clinical trial. J Clin Periodontol. 1987 Feb;14(2):89–94.

13. ORTHO-PERIO PATIENT: Clinical Evidence & Therapeutic Guidelines. 2018.

14. Nanda R. Esthetics and Biomechanics in Orthodontics. Elsevier Health Sciences; 2014. 631 p.

15. Turner PJ. The clinical evaluation of a fluoride-containing orthodontic bonding material. Br J Orthod. 1993 Nov;20(4):307–13.

16. Krishnan V, Davidovitch Z ’ev. Integrated Clinical Orthodontics. John Wiley & Sons; 2012. 530 p.

17. Quinzi V, Carli E, Mummolo A, De Benedictis F, Salvati SE, Mampieri G. Fixed and removable orthodontic retainers, effects on periodontal health compared: A systematic review. J Oral Biol Craniofac Res. 2023 Mar 9;13(2):337–46.

18. Lang NP, Lindhe J. Clinical Periodontology and Implant Dentistry, 2 Volume Set. John Wiley & Sons; 2015. 1480 p.

19. Rao A. Principles and Practice Of Pedodontics. JP Medical Ltd; 2012. 529 p.

20. Diamanti-Kipioti A, Gusberti FA, Lang NP. Clinical and microbiological effects of fixed orthodontic appliances. J Clin Periodontol. 1987 Jul;14(6):326–33.

21. Trushkowsky RD. Esthetic Oral Rehabilitation with Veneers: A Guide to Treatment Preparation and Clinical Concepts. Springer Nature; 2020. 410 p.

22. Dental Caries: Diagnosis, Prevention and Management. BoD – Books on Demand; 2018. 178 p.