MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 2, 2026, Pages 2609-2612

Comparative Assessment of Oral Hygiene Maintenance Around Wire and Fiber Reinforced Periodontal Splints: A Retrospective Institutional Study

Running Title: Oral Hygiene Maintenance Around Periodontal Splints

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Abstract

Background: Periodontal splinting is commonly performed to stabilize mobile teeth and improve functional comfort in patients with periodontal compromise. Maintenance of oral hygiene around splinted teeth is essential for long-term periodontal stability, as splints may act as plaque-retentive areas and influence gingival health.

Aim: To comparatively assess oral hygiene maintenance around wire and fiber reinforced periodontal splints among periodontal patients in a university setting.

Materials and Methods : The present retrospective institutional study analyzed 1,395 periodontal splinting records retrieved between June 2019 and January 2026 from the Department of Periodontics. Among the included cases, 1,091 patients received wire splints and 304 patients received fiber reinforced splints. Patient records with complete demographic details and Oral Hygiene Index-Simplified (OHI-S) scores were included. Oral hygiene status was categorized as good, fair, or poor based on OHI-S scores. Data were analyzed using SPSS software version 26.0. Descriptive statistics and Chi-square tests were used for statistical analysis, with $p < 0.05$ considered statistically significant.

Results: Wire splints constituted 78.2% of all splinting procedures, while fiber reinforced splints accounted for 21.8%. Male patients represented 58.2% of the study population. Fair oral hygiene status was observed in 53.1% of patients, followed by good oral hygiene in 27.4% and poor oral hygiene in 19.5%. Patients with fiber reinforced splints demonstrated comparatively better oral hygiene maintenance than those with wire splints. Mandibular anterior teeth constituted the most commonly splinted region (59.1%). A statistically significant association was observed between splint type and oral hygiene status ($p < 0.05$).

Conclusion : Fiber reinforced splints demonstrated comparatively better oral hygiene maintenance than wire splints, indicating the importance of splint design and material selection in long-term periodontal maintenance.

Keywords: Fiber reinforced splint; Wire splint; Oral Hygiene Index-Simplified; health, quality of life.

Introduction

Periodontal splinting is a widely accepted therapeutic procedure used to stabilize mobile teeth and improve patient comfort, function, and periodontal support (1). Tooth mobility is a common clinical finding in patients with moderate to severe periodontal disease and may significantly affect mastication, speech, esthetics, and overall quality of life (2). Splinting procedures are often performed as an adjunct to periodontal therapy to distribute occlusal forces more evenly, reduce trauma from occlusion, and facilitate periodontal healing. The long-term success of periodontal splinting depends not only on stabilization of mobile teeth but also on effective plaque control and maintenance of periodontal health around the splinted region (3).

Various splinting materials and techniques have been introduced in periodontal practice, among which wire splints and fiber reinforced splints are the most commonly used (4). Wire splints generally utilize stainless steel orthodontic wire combined with composite resin to stabilize periodontally compromised teeth. Fiber reinforced splints, on the other hand, employ esthetic fiber materials incorporated within resin composite, providing improved esthetics, patient comfort, and enhanced adaptability (5). Although both splinting methods effectively stabilize mobile teeth, differences may exist in their ability to permit adequate oral hygiene maintenance and plaque control (6).

Maintenance of oral hygiene around splinted teeth is considered a critical factor influencing the long-term prognosis of periodontal therapy (7). Splints may create plaque-retentive areas and interfere with routine oral hygiene practices if not properly designed or maintained. Increased plaque accumulation around splints may contribute to gingival inflammation, bleeding on probing, calculus deposition, and progression of periodontal destruction. Therefore, evaluation of oral hygiene status around different splinting materials is clinically important in determining their periodontal compatibility and long-term effectiveness (8).

Wire splints are often associated with increased plaque retention because of their contour and metallic framework, which may interfere with interdental cleaning procedures. In contrast, fiber reinforced splints are generally considered more aesthetic and smoother in surface morphology, potentially allowing improved patient comfort and oral hygiene maintenance (9). However, clinical evidence comparing oral hygiene maintenance around wire and fiber splints remains limited, particularly in retrospective institutional settings. Periodontal maintenance therapy and patient compliance play major roles in preserving periodontal stability following splint placement. Assessment of plaque index, gingival inflammation, and oral hygiene status around splinted teeth may provide valuable information regarding the clinical performance of different splinting materials. Comparative evaluation of wire and fiber splints may also help clinicians select splinting methods that offer improved periodontal health and easier maintenance for patients undergoing periodontal therapy (10).

Retrospective institutional studies provide important insight into treatment outcomes and maintenance patterns observed in routine clinical practice. Evaluation of oral hygiene maintenance around different periodontal splints may contribute to evidence-based decision-making in splint selection and long-term periodontal care. Furthermore, understanding the influence of splint design on plaque accumulation and gingival health may help improve patient education and maintenance protocols. Therefore, the present retrospective institutional study was undertaken to comparatively assess oral hygiene maintenance around wire and fiber reinforced periodontal splints among periodontal patients treated in a university setting.

Materials and Methods

Study Design and Study Setting; The present study was designed as a retrospective institutional study conducted in the Department of Periodontics of a university dental hospital. The study evaluated patient records involving periodontal splinting procedures performed using wire and fiber reinforced splints. Ethical clearance for the study was obtained from the Institutional Ethical Committee prior to commencement of the study.

Study Population: Patient records retrieved between June 2019 and January 2026 were screened from the institutional digital database management system. A total of 1,395 splinting records with complete clinical and demographic details were included in the final analysis after application of inclusion and exclusion criteria. Among these, 1,091 cases involved wire splints, while 304 cases involved fiber reinforced splints.

Inclusion Criteria

- Patients who underwent periodontal splinting procedures using wire or fiber reinforced splints.
- Records with complete demographic and clinical documentation.

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ISSN: 1053-7899
Vol. 36 Issue 2, 2026, Pages 2609-2612

- Patients with documented periodontal maintenance records and Oral Hygiene Index-Simplified (OHI-S) scores.
- Splinted teeth with follow-up periodontal evaluation.

Exclusion Criteria

- Incomplete or duplicated patient records.
- Patients without adequate follow-up documentation.
- Cases with prosthetic splints or temporary stabilization procedures.
- Patients with systemic conditions significantly affecting periodontal healing.

Data Collection

The patient records were retrieved and reviewed from the institutional electronic database. The following variables were collected and tabulated:

- Age
- Gender
- Type of splint used
- Oral Hygiene Index-Simplified (OHI-S) score
- Arch involved
- Splinted tooth region

The splinting methods evaluated in the study included:

- Wire splints
- Fiber reinforced splints

Oral hygiene maintenance around splinted teeth was assessed using the Oral Hygiene Index-Simplified (OHI-S) proposed by Greene and Vermillion. The OHI-S score was used to evaluate the oral hygiene status based on debris and calculus accumulation around splinted teeth during maintenance visits.

The OHI-S scores were categorized as:

- Good oral hygiene: 0.0–1.2
- Fair oral hygiene: 1.3–3.0
- Poor oral hygiene: 3.1–6.0

Study Parameters: The primary outcome assessed was oral hygiene maintenance around wire and fiber reinforced periodontal splints based on OHI-S scores. Secondary outcomes included comparison of oral hygiene status between wire and fiber splints, demographic distribution, and arch-wise distribution of splinted teeth.

Statistical Analysis: The collected data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) software version 26.0. Descriptive statistics were used to summarize demographic variables and splint distribution. Frequencies and percentages were calculated for categorical variables. The association between splint type and oral hygiene status based on OHI-S scores was analyzed using the Chi-square test. Statistical significance was considered at $p < 0.05$.

Results:A total of 1,395 periodontal splinting records retrieved between June 2019 and January 2026 were included in the final analysis after application of the inclusion and exclusion criteria. The distribution of splint type, demographic variables, and oral hygiene status assessed using the Oral Hygiene Index-Simplified (OHI-S) were analyzed.

Among the total splinting procedures performed, wire splints constituted the majority with 1,091 cases (78.2%), whereas fiber reinforced splints accounted for 304 cases (21.8%). This indicated a greater clinical preference for wire splinting procedures in periodontal stabilization therapy. The distribution of splint types is illustrated in Graph 1 and summarized in Table 1.

Gender-wise distribution demonstrated a slight male predominance among patients undergoing periodontal splinting procedures. Male patients accounted for 812 cases (58.2%), while female patients constituted 583 cases (41.8%). The majority of splinting procedures were performed in patients belonging to the 31–50 years age group, reflecting increased periodontal mobility and stabilization requirements in middle-aged adults.

Assessment of oral hygiene maintenance using the OHI-S index demonstrated varying levels of oral hygiene status among the study population. Good oral hygiene status was observed in 382 patients (27.4%), fair oral hygiene status was identified in 741 patients (53.1%), while poor oral hygiene status was observed in 272 patients (19.5%). Fair oral hygiene constituted the predominant category among splinted patients, as shown in Graph 2 and consolidated in Table 1.

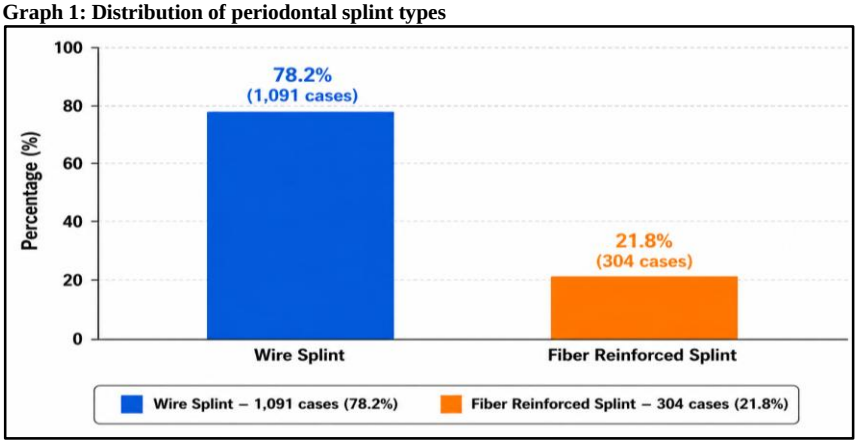
Comparative evaluation between wire and fiber reinforced splints demonstrated that patients with fiber splints showed relatively better oral hygiene maintenance compared with wire splints. Among wire splint cases, fair and poor OHI-S scores were more frequently observed, whereas fiber reinforced splints demonstrated comparatively higher proportions of good oral hygiene scores. The association between splint type and oral hygiene status was found to be statistically significant ($p = 0.028$). Arch-wise analysis demonstrated that mandibular anterior teeth constituted the most commonly splinted region with 824 cases (59.1%), followed by maxillary anterior teeth with 497 cases (35.6%). Combined maxillary and mandibular splinting was observed in 74 cases (5.3%). The distribution of splinted regions is represented in Graph 3 and summarized in Table 1.

Table 1: Distribution of periodontal splinting procedures and oral hygiene status

Parameter	Number of Cases (n)	Percentage (%)	p-value
Type of Splint			
Wire splint	1091	78.2	0.028*
Fiber reinforced splint	304	21.8	
Gender Distribution			
Male	812	58.2	0.114
Female	583	41.8	
OHI-S Oral Hygiene Status			
Good (0.0–1.2)	382	27.4	0.028*
Fair (1.3–3.0)	741	53.1	
Poor (3.1–6.0)	272	19.5	
Splinted Region			
Maxillary anterior	497	35.6	0.036*
Mandibular anterior	824	59.1	
Both arches	74	5.3	

*Statistically significant ($p < 0.05$)

Graph 1: Distribution of periodontal splint types



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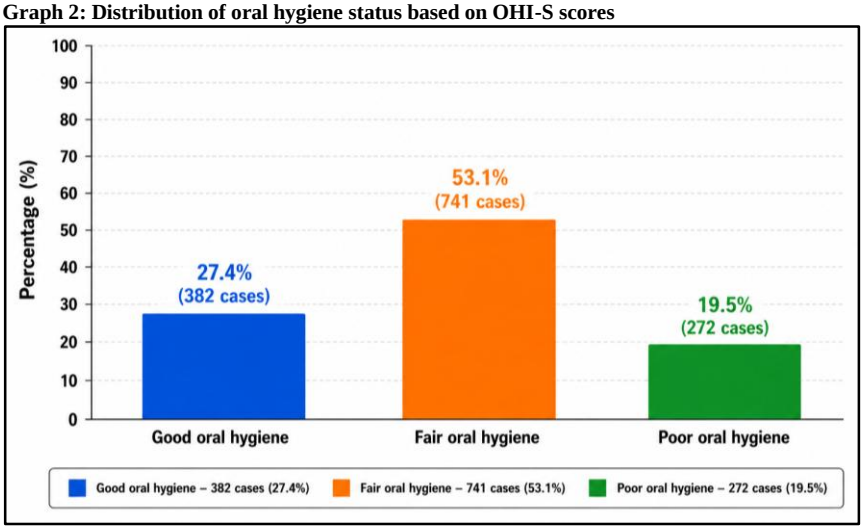
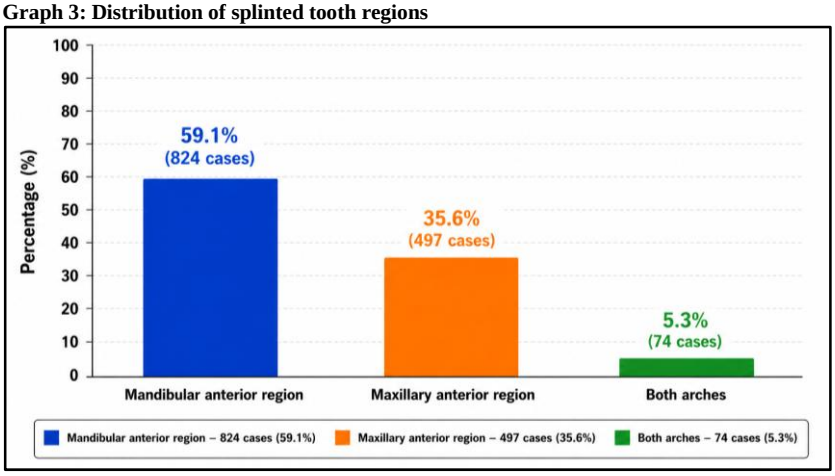
ISSN: 1053-7899
Vol. 36 Issue 2, 2026, Pages 2609-2612

Graph 2: Distribution of oral hygiene status based on OHI-S scores



Graph 3: Distribution of splinted tooth regions



Discussion

The present retrospective institutional study comparatively evaluated oral hygiene maintenance around wire and fiber reinforced periodontal splints using the Oral Hygiene Index-Simplified (OHI-S). Periodontal splinting is an important adjunctive procedure performed to stabilize mobile teeth and improve functional comfort in patients with periodontal compromise (11). Although splinting contributes significantly to tooth stabilization and periodontal support, maintenance of adequate oral hygiene around splinted teeth remains essential for long-term periodontal success. The findings of the present study demonstrated significant differences in oral hygiene maintenance between wire and fiber reinforced splints, emphasizing the influence of splint design and material on plaque control and periodontal health (12).The present study demonstrated that wire splints were more commonly used than fiber reinforced splints, accounting for 78.2% of all splinting procedures performed. This finding may be attributed to the long-standing clinical use of wire splints because of their ease of application, affordability, availability, and predictable stabilization properties (13). Wire splints have traditionally been preferred in periodontal practice for management of mobile anterior teeth, particularly in cases requiring immediate stabilization. Their widespread use in the present study may also reflect clinician familiarity and institutional treatment trends over the study period (14).

Fiber reinforced splints accounted for a comparatively lower proportion of cases. Despite their superior aesthetics and improved patient comfort, fiber splints may be less frequently used because of higher material cost, technique sensitivity, and the requirement for greater operator skill during placement. Nevertheless, the increasing utilization of fiber reinforced splints observed in recent years reflects the growing preference for minimally invasive and esthetically acceptable periodontal treatment options (15).Assessment of oral hygiene maintenance using OHI-S scores demonstrated that fair oral hygiene status was the most common finding among splinted patients. More than half of the patients exhibited fair oral hygiene scores, while poor oral hygiene was observed in nearly one-fifth of the study population. These findings suggest that splinted regions may act as plaque-retentive areas, making routine oral hygiene maintenance more challenging for patients. Splints can interfere with interdental cleaning procedures and may predispose patients to accumulation of plaque and calculus if adequate maintenance measures are not followed.

Comparative analysis between wire and fiber reinforced splints revealed that patients with fiber splints demonstrated relatively better oral hygiene maintenance compared with wire splints (11). This finding may be explained by the smoother surface characteristics and more favorable contour of fiber reinforced splints, which permit easier cleaning and reduced plaque retention. Fiber splints are generally thinner, more esthetic, and less bulky than conventional wire splints, thereby facilitating improved patient compliance with oral hygiene procedures. In contrast, wire splints may create irregular surfaces and undercuts that favor plaque accumulation and hinder effective interdental cleaning.

The statistically significant association observed between splint type and oral hygiene status indicates that the choice of splinting material may influence periodontal maintenance outcomes. This finding is clinically relevant because long-term plaque accumulation around splinted teeth may contribute to gingival inflammation, bleeding on probing, periodontal pocket formation, and recurrence of periodontal destruction (5). Therefore, selection of splinting material should not only consider stabilization requirements but also the patient's ability to maintain adequate oral hygiene around the splinted region.

The present study also demonstrated that the mandibular anterior region constituted the most commonly splinted area. This finding is consistent with the clinical pattern of periodontal disease progression, where mandibular anterior teeth are frequently affected by mobility because of reduced root surface area, plaque accumulation, traumatic occlusal forces, and alveolar bone loss. The mandibular anterior region is particularly susceptible to calculus deposition and periodontal breakdown, often necessitating stabilization procedures following periodontal therapy.

The slight male predominance observed in the present study may be associated with increased prevalence and severity of periodontal disease among male patients, as reported in previous periodontal literature. Differences in oral hygiene practices, tobacco usage, and periodontal maintenance compliance may contribute to increased periodontal mobility and splinting requirements among males (3). Maintenance therapy and patient motivation remain critical determinants of long-term periodontal prognosis following splint placement. Patients undergoing periodontal splinting should be educated regarding the importance of meticulous plaque control measures, including use of interdental aids and regular professional maintenance visits. Proper oral hygiene instruction may significantly reduce plaque accumulation and improve periodontal stability around splinted teeth.

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ISSN: 1053-7899
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The present study provides valuable institutional evidence regarding oral hygiene maintenance around different periodontal splints. Retrospective analyses such as this may help clinicians better understand the periodontal implications of splinting materials and improve treatment planning decisions in periodontal stabilization therapy.

However, certain limitations should be considered while interpreting the findings. The retrospective design relied on institutional records and documented OHI-S scores, which may vary depending on operator assessment and patient follow-up compliance. The study did not evaluate long-term survival of splints, patient satisfaction, or quantitative periodontal attachment changes associated with different splinting materials. In addition, the study was conducted in a single institutional setting, which may limit generalization of the findings.

Within the limitations of the present study, fiber reinforced splints demonstrated comparatively better oral hygiene maintenance than wire splints, suggesting that splint design and material characteristics play an important role in periodontal maintenance and plaque control around splinted teeth.

Conclusion

Within the limitations of the present retrospective institutional study, fiber reinforced periodontal splints demonstrated comparatively better oral hygiene maintenance than wire splints based on OHI-S scores. Wire splints were more frequently associated with fair and poor oral hygiene status, whereas fiber splints showed relatively improved plaque control and periodontal maintenance. The findings of the study emphasize that splint material and design play an important role in maintaining periodontal health around splinted teeth and should be carefully considered during periodontal stabilization therapy.

Conflict of interest : nil

Funding : nil

Acknowledgment : The authors would like to express their sincere gratitude to the management of Saveetha Dental College and Hospitals for providing access to the institutional digital records and necessary support to conduct this retrospective study.

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