

## The Post-Cementation Periodontal Response to Resin Retained Bridge

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### ABSTRACT

**Objective:** To compare the mean periodontal health of resin retained abutment tooth with its baseline score.

**Study Design:** Quasi-experimental study.

**Place and Duration of Study:** Department of Prosthodontics, Armed Forces Institute of Dentistry Rawalpindi Pakistan, from Oct 2019 to Mar 2020.

**Methodology:** Before starting abutment preparation, the baseline scores for gingival index, plaque index and periodontal pocket depth of the abutment teeth were calculated. The gingival index was calculated using a blunt probe, whereas the periodontal pocket depth of the teeth in both groups was calculated using a calibrated periodontal probe.

**Results:** According to the results recorded there was a significant difference seen in the mean periodontal health of abutment teeth before and after the cementation of the resin-bonded bridge. Our calculated *p*-value (0.001) indicated definitive significance associated with both the groups i.e., before and after the score of gingival indices and before and after the score of periodontal pocket depth, after 30 days of provision of the resin-bonded bridge.

**Conclusion:** There was a significant association found in the mean periodontal health of abutment teeth before and after the cementation of the resin-bonded bridge.

**Keywords:** Gingival index, Periodontal pocket depth, Periodontal probe.

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### INTRODUCTION

A conventional fixed partial denture is an irreversible treatment option for tooth replacement and requires greater tooth preparation.<sup>1</sup> Preparation sequence requires adequate reduction of the abutments which may compromise; the vitality of the pulp tissue. Plaque accumulation and gingival inflammation have been reported around the teeth which have been restored with a fixed dental prosthesis.<sup>2</sup> Removable partial denture are a cost-effective treatment modality for the patient as it partially restores functional needs and aesthetics, however, problems of poor retention, and stability along with patient compliance with denture hygiene instructions remain a major concern. The provision of a removable prosthesis thus may be seen as a difficult option for many individuals. Time related bone resorption may cause the removable prosthesis to become loose and unstable, this time related alveolar ridge alteration may be prevented by using dental implants which provide a more aesthetic and durable option for the replacement of missing teeth.<sup>3</sup> Placing a dental implant is a technique sensitive procedure requiring proper oral examination with detailed dental

and medical history, along with radiographic analysis for treatment planning. Dental implants cannot be placed in young individuals in the growing phase and patients having medical contraindications.

A resin retained bridge is a fixed dental prosthesis that replaces a missing tooth by relying on composite resin cement for its retention. Resin retained bridge consists of a cast metal framework that is attached to abutment teeth using resin cement, which has its preparation confined either entirely or almost entirely to the enamel.<sup>4</sup> The advantages of resin retained bridges over conventional fixed bridges include little or no damage to the adjacent teeth, economically cheaper than the implant, failure is likely to be de-bonding of the retainer rather than fracture of the abutments as in the case of conventional fixed bridges. On the other hand, resin retained bridges also present with some disadvantages such as in the majority of cases the metal wing is extended to the incisal edge of anterior teeth which results in overlapping of the occlusal surface of the posterior teeth.<sup>5</sup> Cementation of resin retained bridge is a technique sensitive procedure in which proper isolation of the operating field is required as contamination causes a decrease in bond strength of cement leading to premature failure. Resin retained bridges also have shown an increased incidence of

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periodontal problems.<sup>6</sup> The rationale of this study was to determine the effects of resin-bonded bridges on the natural abutment teeth so that its provision as a viable treatment option for patients might be determined.

## METHODOLOGY

This study was a quasi-experimental study with a non-probability consecutive sampling technique. After approval from the ethics committee (AFID/ERC/2019/07), from October 2019 to March 2020 the study was conducted at the Department of Prosthodontics, Armed Force Institute of Dentistry, Rawalpindi Pakistan.

**Inclusion Criteria:** Subjects with age ranging from 18-45 years, both gender, with good oral hygiene, no history of periodontal therapy and to whom resin retained bridge has been advised as a fixed restoration, were included in the study.

**Exclusion Criteria:** Subjects with a history of bruxism or cervical caries or oral lesions like oral cancer or ulcers, or with a history of diabetes mellitus, epilepsy or any other medical condition, or teeth with poor prognosis were excluded from the study.

A total of 30 subjects were included in the study. Before starting the procedure written consent of the subjects was taken along with the baseline scores for gingival index, plaque index and periodontal pocket depth of the abutment teeth were calculated. The gingival index (by Silness and Loe method) was calculated using a blunt probe, whereas the periodontal pocket depth of the teeth in both the groups was calculated using a calibrated periodontal probe with millimetres markings (UNC15 probe). The score for each abutment tooth was recorded. After 30 days of cementation of the Resin Retained Bridge, the subject was recalled for follow up and the scores of the abutment teeth for gingival index and periodontal pocket depth of the abutment teeth were recorded again for comparison.

The clinician selecting the subjects knew regarding dental treatment and dental hygiene status the patient underwent however the clinician measured the baseline scores for gingival index, plaque index and periodontal pocket depth of the abutment teeth was not aware of this fact in this way bias was prevented.

The gingival index was as follows: Grade-0 Normal gingiva, Grade-1 Mild inflammation with a slight change in colour, slight oedema and no bleeding on probing, Grade-2 Moderate inflammation with redness, oedema and glazing with bleeding on probing whereas Grade-3 Severe inflammation with marked

redness and oedema, ulceration and subject tend to spontaneous bleeding.<sup>7</sup> Plaque index ranges from Grade-0 to Grade-3, where Grade-0 represented the absence of plaque, Grade-1 represented a thin layer of plaque at the gingival margin, only distinguishable by abrading with a probe, Grade-2 represented moderate coating of plaque along the gingival margin; in which absence of plaque at interdental spaces but visible to the naked eye, Grade-3 represented the profuse amount of plaque along the gingival margin as well as the interdental spaces.<sup>8</sup>

The maximum outcome for each individual was noted. The data was analysed using SPSS 20. Mean and standard deviation were calculated for age, the score of Gingival Index, and Periodontal Pocket depth for both groups. Frequency and percentage were calculated for gender. Paired sample t-test was used to compare quantitative variables like the score of the gingival index and periodontal pocket depth of baseline 30 days after the provision of fixed restoration. The *p*-value of  $\leq 0.05$  was set as the cut-off value for significance.

## RESULTS

The study was conducted to find the comparison of gingival health in terms of gingival indices and periodontal pocket depth, pre and post cementation of the resin-bonded bridge. Table-I showed the distribution of age, baseline score of the gingival index and periodontal pocket depth 30 days after the provision of a resin-bonded bridge for the patients included in the sample.

**Table-I: Descriptive Analysis of age, gingival indices and periodontal pocket depth (n=30).**

Parameters	Mean $\pm$ SD
Age	34.50 $\pm$ 7.78 years
Baseline Score of Gingival Indices	39.60 $\pm$ 2.88
Post Score of Gingival Indices	74.97 $\pm$ 4.62
Baseline Periodontal Pocket Depth	0.57 $\pm$ 0.50mm
Post Periodontal Pocket Depth	1.60 $\pm$ 0.49mm

From a sample of 30 individuals, there were 17 males (56.7%) while 13 females (43.3%) were selected. The mean age of the individuals was found to be 34.50  $\pm$  7.78, while the mean baseline score of gingival indices (39.60  $\pm$  2.88) and post the score of gingival indices (74.97  $\pm$  4.62), Baseline periodontal pocket depth (0.57  $\pm$  0.50) and post periodontal pocket depth (1.60  $\pm$  0.49) were recorded.

It was observed that there was a significant association (*p*-value 0.001) found between both groups i.e., score of gingival indices before and 30 days after the

provision of the resin-bonded bridge (Table-II) as well as the score of periodontal pocket depth before and 30 days after the provision of the resin-bonded bridge (Table-III).

**Table-II: Comparison of score of gingival indices before and 30 days after the provision of resin bonded bridge.**

Groups	Mean Duration of Active Phase	p-value
Baseline Score of Gingival Indices	39.60 ± 2.88	0.001
Post Score of Gingival Indices	74.97 ± 4.62	

**Table-III: Comparison of score of periodontal pocket depth before and 30 days after the provision of resin bonded bridge (n=30).**

Groups	Mean Duration of Active Phase	p-value
Baseline Periodontal Pocket Depth	0.57 ± 0.50mm	0.001
Post Periodontal Pocket Depth	1.60 ± 0.49mm	

## DISCUSSION

This study was done to compare the mean periodontal health of resin retained abutment tooth with its baseline score. Provision of resin retained fixed partial denture is a very common treatment modality provided to patients with missing maxillary lateral incisor and/or mandibular anterior tooth.<sup>8</sup> Maintaining good oral hygiene is of paramount importance to preserve the periodontal health of the abutment tooth supporting the prosthesis otherwise it may result in failure of the prosthesis as well as the tooth-supporting it. Multiple cleaning aids are available such as Interdental brushes, Dental floss, Mouth wash and Water-pik devices which help to clean the food debris entrapped or present around the teeth preventing periodontal diseases.<sup>9</sup>

Our study showed a significant relationship between mean periodontal health of abutment teeth supporting the resin retained fixed partial denture pre and post-placement when compared with gingival indices as well as periodontal pocket depth. The data collected when compared with baseline scores showed approximately twice the increase in the score of gingival indices and thrice increase in the pocket depth, 30 days post placement of the prosthesis. It shows the difficulty in maintaining oral hygiene when the patient is provided with a resin retained bridge. As cleaning of palatal and proximal surfaces is not possible by using cleaning aids periodontal disease may result in later stages. Thus opting for an implant-supported crown,

CAD-CAM fabricated all-ceramic bridge or a removable partial denture may present as a better option for the replacement of a single missing tooth.<sup>10</sup>

Previous studies suggest a higher incidence of periodontal and periapical lesions with fixed restorations.<sup>11-13</sup> Periodontal status of the abutment teeth is an important prerequisite for the success of a fixed restoration. Several studies indicated that poor marginal adaptation, sub-gingival margin placement, and over-contoured crowns have the possibility of contributing to localized periodontal inflammation.<sup>14,15</sup> Clinical experiences have shown that if one of the abutments of a fixed partial denture fails, the whole prosthesis fails often with the loss of the abutment tooth and resulting in a destructive clinical outcome.<sup>16</sup>

Many studies have been conducted trying to determine the possible methods for increasing the success rate of resin retained bridge while preserving the periodontal health of the abutment. It was found that different factors were involved in increasing the success rate which included patient factors, abutment tooth selection, occlusal features and bridge design.<sup>17</sup> Followed by step by step technique sensitive protocol for preparation, impression, fabrication and cementation of the resin retained bridge.<sup>18</sup> Advances in clinical techniques further provided better results post placement of resin retained bridge by preparation of abutment teeth and fabrication of prosthesis with maximum contact with lingual and proximal surfaces.<sup>19</sup> Thus provision of resin retained bridge is better as it is more conservative to the tooth structure, maintains aesthetics and functionality, and provides psychological support and confidence to the patient.<sup>20</sup>

This study helped us to understand different factors which determine the long term success of resin-bonded bridges ensuring an excellent long term prognosis of abutment teeth. Starting from patient selection, oral examination and treatment planning thus ensuring good supportive abutments for the prosthesis to bond and overall satisfaction of the patient once the prosthesis is provided. Maintenance of prosthesis and abutment teeth is done with the help of cleaning aids, with proper demonstration to the patient we can help them to understand its importance and usage thus preventing periodontal diseases. The patients should always be emphasized the importance of follow up visits for ensuring disease-free oral cavity and conservative treatment in case any oral lesion or disease is established.

**LIMITATION OF STUDY**

Duration of study was only 6 months and was not followed up to one to two years. Secondly only single design of resin bonded bridge was provided to the patient which was Maryland Bridge rather than providing different designs for observation.

**CONCLUSION**

There was a significant association found in the mean periodontal health of abutment teeth before and after the cementation of the resin-bonded bridge. It is recommended that resin-bonded bridges should be advised as a viable treatment option for single missing tooth replacement only after appropriate patient selection and thorough treatment planning.

**Conflict of Interest:** None.

**Author’s Contribution**

SM: Research idea, Methodology, critical review QA: Data Collection and critical review, AA: Statistical analysis, results and revisions, MQ: Data collection and discussion, MS: Introduction and Conclusion, AA: Results and revisions.

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