Evaluation of Periodontal Pocket Depth around Single Tooth Implant with Cement and Screw-retained Implant Prosthesis


ABSTRACT

This clinical trial was planned to examine the long-standing clinical achievement of dental implants equipped either with cemented or screw-retained systems. A total of 100 teeth were selected based on the following inclusion criteria: should have a particular implant by means of cement and screw implant prosthesis, participants should have superior oral hygiene, non-alcoholic and non-smoker patients, and aged between 20 - 65 years. They were separated into two groups: 50 teeth were cemented (group A) and 50 by a screw (group B) system. At least 24 months evaluation was integrated to measure the periodontal pocket depth. Statistical analysis was done by using SPSS (Statistical Package for Social Science) where comparisons were assess by using the Chi-square test, Fisher's exact test; a P-value <0.05 was considered significant. It was found that at six months, periodontal pocket depth was increased in 2.0% of teeth in Group-A, but none in Group-B. Periodontal pocket depth increased significantly in group A (20%) at 12 months comparing to group B (4.0%). In the same way, at 18 and 24 months, teeth in group-A had significantly higher periodontal pockets (64.0% and 84.0%, respectively) than in group-B (8.0% and 32.0%, respectively). It can be stated that comparing to the cemented implant, the screw implant prosthesis perform better in terms of their periodontal pocket depth.

Keywords: Cement retained prosthesis, periodontal pocket depth, periodontal probe, screw retained prosthesis.

I. INTRODUCTION

Recently, people are interested in oral rehabilitation to increase their functional and aesthetic quality of life. This supports the demands of dentistry to replace a lost tooth at an early stage [1], [2]. However, several concerns have been raised regarding their long-term clinical success. Among them, the connection between the replacement and the implant is an important issue due to the variations of the implant system such as a screw or with cement [3], [4]. In the screw system, the screw made a firm joint between the restorations and the implant abutments, therefore they have predictable retention, irreversibility and no subgingival cementum [5], [6]. However, in a cement-retained prosthesis, the implant prosthesis is cemented with an osseointegrated root, which can lead to the extradition of excess cement from the prosthesis abutment and causes inflammation of periodontium [7], [8]. In addition, at least 5 mm of abutment height is mandatory for proper retention and stability of a cement-retained prosthesis [9], [10]. For that reason, many researchers have recommended the use of a screw prosthesis where the abutment height is less than 5 mm [11], [12].

Many studies have been conducted to assess the adverse side effect of an implanted prosthesis on peri-implant gingival structures. These include serious biological hazard such as peri-implant inflammation, soft tissue enlargement, probing on flow of blood and crystalline bone loss [13], [14].
In a cemented prosthesis, dental plaque is retained around the prosthesis due to the rough surface, which can lead to inflammatory periodontal disease such as peri-implantitis and destruction of alveolar bone around the implant [15], [16]. Therefore, the use of screw prosthesis has increased in dentistry due to less periodontal complications than cemented prosthesis [17], [18].

Based on earlier studies, it can be assumed that a screw implant prosthesis could be more advantageous than a cemented prosthesis in terms of their periodontal pocket depth [18], [19]. Before finalizing, the consequence of the screw implant prosthesis on the depth of the periodontal pocket needs to be acceptable. Consequently, the purpose of this prospective clinical study is to analyze and compare the peri-implant tissue around a single-tooth implant using periodontal pocket depth analysis with a cement- and screw-retained implant prosthesis.

II. MATERIALS AND METHODS

This clinical trial was performed at the Department of Prosthodontics of Holy Family Red Crescent Medical College Hospital (HFRCMCH) including various dental clinics in Dhaka. A total of 50 cement-retained (group A) and 50 screw-retained (group B) teeth having single-tooth implant prosthesis were chosen with the following inclusion criteria: teeth with one cement-retain implant and screw-retained prosthesis. Furthermore, participants should have superior oral hygiene, non-alcoholic and non-smoker and the age should be arranged between the 20-65 years. A following standardized clinical and laboratory procedures, each patient were evaluated at 6, 12, 18, and 24 months of fixation to quantify the periodontal pocket depth. Achieved data was statistically verified to find out the significance differences of the result. They were subjected to statistical analysis using SPSS (Statistical Package for Social Science). The comparison between the results were made using the Chi-square test, Fisher's exact test; a P-value <0.05 was considered significant.

III. RESULTS

This study incorporated 100 adult patients of both sexes who needed a single tooth implant. They were separated into two groups. Group A incorporated fifty patients who had a cement-retained implant, while fifty patients in group B who had a screw-retained implant. The increased of the periodontal pocket depth around each implanted teeth was verified clinically and radiologically up to 24 months.

The mean age of patients in group-A was 38.16 ± 12.46 years (range: 21 to 63 years) and the mean age of patients in group-B was 41.30 ± 12.35 years (range: 22 to 65 years). In both groups, the number of male was greater than the female, and they were clarified as follows: Group A comprised of 60.0% male and 40.0% female, while group B had 56% male and 44% female. But the difference in frequency of male and female patients was not statistically significant.

At six months of implantation, periodontal pocket was increased in 2.0% of the teeth in group-A patients while there was no change of periodontal pocket depth before and after implantation in group B. However, the results achieved at 6 months were not significant. At 12 months of evaluation, the pocket depth was increased in 20.0% around the teeth in group A, while 4% in group B (P=0.028). In the same way, at 18 months and 24 months, an increase of periodontal depth was higher in Group-A than that of group B; the pockets was increased in 64.0% of the participants at 18 months followed by 84.0% at 24 months. On the other hand, in group B, it was ranged from 8.0% and 32.0%, respectively at 18 and 24 months. The differences between the groups were statistically significant (P<0.001).
TABLE I: DISTRIBUTION OF THE STUDY SUBJECTS ACCORDING TO AGE (N=100)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Group A f (%)</th>
<th>Group B f (%)</th>
<th>df</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 – 30</td>
<td>19 (38.0)</td>
<td>13 (26.0)</td>
<td>1</td>
<td>1.01</td>
<td><em>0.000</em>*</td>
</tr>
<tr>
<td>31 – 40</td>
<td>13 (26.0)</td>
<td>14 (28.0)</td>
<td>1</td>
<td>0.66</td>
<td>0.508</td>
</tr>
<tr>
<td>41 – 50</td>
<td>6 (12.0)</td>
<td>9 (18.0)</td>
<td>1</td>
<td>0.37</td>
<td>0.706</td>
</tr>
<tr>
<td>51 – 60</td>
<td>11 (22.0)</td>
<td>13 (26.0)</td>
<td>1</td>
<td>0.90</td>
<td>0.368</td>
</tr>
<tr>
<td>&gt;60</td>
<td>1 (2.0)</td>
<td>1 (2.0)</td>
<td>1</td>
<td>0.00</td>
<td>0.999</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>50</td>
<td>7</td>
<td>0.23</td>
<td>0.810</td>
</tr>
</tbody>
</table>

Mean ± SD: 38.16 ± 12.46, Group A: 31.30 ± 12.35, Group B: 34.00 ± 12.46, p = 0.029

Min - max: 21 - 63, Group A: 22 - 65, Group B: 21 - 65

Unpaired t test was done to measure the level of significance ns – not significant

TABLE II: DISTRIBUTION OF THE STUDY SUBJECTS ACCORDING TO GENDER (N=100)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Group A f (%)</th>
<th>Group B f (%)</th>
<th>df</th>
<th>X²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>30 (60.0)</td>
<td>28 (56.0)</td>
<td>1</td>
<td>0.164</td>
<td>0.685**</td>
</tr>
<tr>
<td>Female</td>
<td>20 (40.0)</td>
<td>22 (44.0)</td>
<td>1</td>
<td>0.108</td>
<td>0.746</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>50</td>
<td>1</td>
<td>0.00</td>
<td>0.999</td>
</tr>
</tbody>
</table>

Chi-Square was done to measure the level of significance ns – not significant

TABLE III: PERIODONTAL POCKET STATUS AT BASELINE AND AFTER THE PROCEDURES AT DIFFERENT FOLLOW UPS (N=100)

<table>
<thead>
<tr>
<th>Periodontal pocket status</th>
<th>Group A f (%)</th>
<th>Group B f (%)</th>
<th>df</th>
<th>X²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1.01</td>
<td><em>0.000</em>*</td>
</tr>
<tr>
<td>After 6 months</td>
<td>1 (2.0)</td>
<td>0</td>
<td>1</td>
<td>1.01</td>
<td><em>0.000</em>*</td>
</tr>
<tr>
<td>After 12 months</td>
<td>10 (20.0)</td>
<td>2 (4.0)</td>
<td>1</td>
<td>6.06</td>
<td><em>0.028</em></td>
</tr>
<tr>
<td>After 18 months</td>
<td>32 (64.0)</td>
<td>4 (8.0)</td>
<td>1</td>
<td>34.02</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>After 24 months</td>
<td>42 (84.0)</td>
<td>16 (32.0)</td>
<td>1</td>
<td>27.75</td>
<td>&lt;0.001***</td>
</tr>
</tbody>
</table>

*Fisher’s Exact test and Chi-Square test was done to see the level of significance
ns-not significant
*significant
***highly significant

IV. DISCUSSION

The results of this study coincided with the previous studies that cemented implant prosthesis is superior to screw-retained prosthesis in terms of their periodontal pocket depth [20], [21]. The assessment techniques including the MPI, BOP and pocket depth used in this study were formerly based on some of the earlier studies [22], [23]; a variation in the peri-implant tissue was observed after the placement of the prosthetic crown, which may interfere the aesthetics of the prosthesis and lead to a worse clinical result with patient unacceptance [24], [25]. Adding up, the results of this study exposed that complications related to the peri-implant tissues are often associated with dental plaque, hemorrhage during probing and increase the depth of the periodontal pocket. However, the results found in this study had some similarities and differences with those of previous studies.

At six months of implantation, periodontal pocket depth was increased in 2.0% of teeth in Group-A patients, but none in Group-B. Periodontal pocket depth was increased with the observation period but the level was high in group A. Such as at 12 months, 20% of the patients in group A had an increase of pocket depth while in group B it was 4.0%. In the same way, at 18 months and 24 months, group-A patients had a significantly higher number of teeth with increased pocket depth (64.0% and 84.0%, respectively) than group-B patients (8.0% and 32.0%, respectively). The results found in this study are consistent with previous studies that the risk of entrapment of cement residues results in peri-implant inflammation and marginal bone loss [26], [27]. This is also supported by [11] and [28] that peri-implant inflammation is associated with swelling, pain, and increased pocket depth, which may lead to peri-implant bone loss due to cement overflow, but the choice of a screw prosthesis reduces the consequences. These studies agree with the result of that study.

V. CONCLUSION

It can be concluded that comparing to cemented implant prosthesis, the screw implant prosthesis is more suitable in terms of their periodontal pocket sculptures.

CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

REFERENCES


