Study of the Prevalence of Gingival Recession in the Tissues Around Crowned Teeth in Patients of the Faculty of Dentistry of Tishreen University (Statistical, Classification and Therapeutic Study)

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Abstract: The aim of this study was to investigate the role of crowning in the incidence of gingival recession around the crowned teeth. The study also aimed to verify the efficiency of some gingival surgical techniques in treating gingival recession as an alternative to replacing the fixed prosthesis. Moreover, the study opted to compare the percentage of the incidence of gingival recession around permanent prostheses in our society versus that in other societies. This study was conducted using 193 abutments distributed among 98 patients. In a special form per patient, the general and topical health conditions were recorded in addition to the status of the gingival tissue in general and around the prosthesis in particular. The percentage of the prevalence of gingival recession around fixed prosthesis was 31.1% (class 1 (23.3%), class 2 (7.3%), class 3 (0.5%) according to Miller). A total of 193 questionnaires were obtained that revealed the existence of a substantial relationship between the poor marginal adaptation of the crown and the gingival bleeding index and the degree of gingival recession. The results also revealed the lack of a significant relationship between the type of prosthesis used and the degree of gingival recession. Similarly, no significant relationship was noticed between the type of prosthesis used and the gingival bleeding index.

INTRODUCTION

Various studies have proved the existence of an important relationship between periodontal disease and crowns and bridges. The vast majority of these studies focused on the different aspects of the relationship between the prostheses (marginal adaptation, materials used, surface roughness, finishing line) and the health of the periodontal tissue[1-4].

The evaluation of the status of the tissue around the fixed prosthesis is by far the most important in clinical dentistry, since, a prosthesis is considered successful if the prosthesis remained intact for a long period of time without causing damage to the periodontal tissue[5].

Several studies suggested that crowns are often considered problematic for periodontal tissue. The more recent studies evaluated the relationship between dental
prosthesis and periodontal tissue and focused mainly on the resultant gingivitis and not on the periodontal damage. One of the main consequences of gingivitis is gingival recession\(^2,5,6,7\).

**Importance and objectives of the research**

**Importance of the research:** There are few published studies about gingival recession around crowned teeth. A study of the prevalence of gingival recession around crowned teeth is considered useful for several reasons: creating a modern database of the reality of these recessions in order to specify the most important factors that promote their occurrences, providing the best therapeutic and preventive solutions for patients suffering from them and hindering further development of such recessions.

**Objectives of the research:** Investigate the role that crowning plays in causing gingival recession around the crowned teeth for patients in the Faculty of Dentistry at Tishreen University. Verify the efficiency of some gingival surgical techniques in treating gingival recession as an alternative to replacing the fixed prosthesis. Compare the percentage of the incidence of gingival recession around permanent prostheses in our society versus that in other societies.

**MATERIALS AND METHODS**

**Materials:** A special examination and diagnosis form, a study sample comprised of 193 cases, examination and diagnostic tools (flat mirrors, double headed probes, forceps), gingival probe (Williams\(^\text{®}\)), rubber gloves, masks.

**Methods:** The patients visiting the Faculty of Dentistry at Tishreen University (Departments of Fixed Prostheses and Gingival Disease) were examined randomly. A special form for patients who had permanent prostheses for (1-5) years. The oral hygiene level was recorded using: Visible Plaque Index (VPI); Gingival Bleeding Index (GBI; Probing Pocket Depth (PPD); Clinical Attachment Level (CAL). Six points were measured for every tooth (mesiobuccal, distobuccal, buccal, mesiolingual, distolingual, lingual). The Visible Plaque Index (VPI) was measured according to Silness and Leo using 4 scores 0-1-2-3. This was done by passing the edge of the probe on the chosen surface of the tooth being examined. The results were recorded in the following manner: 0 = no deposits, 1 = soft deposits were present which could be detected only on probing, 2 = soft deposits were present which were visible to the naked eye, 3 = severe accumulation of deposits on the teeth and gingiva\(^9\).

Oral hygiene was classified as good if the evaluation was 0<1, satisfactory/fair for values 1<2 and poor for values 2<3\(^8\). The Gingival Bleeding Index (GBI) was measured by gently passing the tip of the probe within the sulcus around every tooth. The values were as follows: 0 = no bleeding, 1 = one bleeding point visible a few seconds after probing, 2 = several bleeding points visible immediately after probing, 3 = profuse bleeding visible a few seconds after probing, blood spreads towards the marginal gingiva. A value of 0 = no gingivitis, 1 = mild gingivitis, 2 = moderate gingivitis whereas 3 = severe gingivitis.

The Probing Pocket Depth (PPD) and the Clinical Attachment Level (CAL) were measured using a Williams\(^\text{®}\) periodontal probe starting at the deepest point in the bottom of the sulcus and up to the margin of the gingiva (PPD) and until the cemento enamel junction (CAL). The measurements were rounded off to the nearest millimeter. The degree of gingival recession was determined according to the classification of Miller, 1985. The adaptations of the prosthesis on the aforementioned six dimensions of the tooth were classified as well fit or maladapted\(^6\).

**RESULTS**

**The relationship between the marginal adaptation of the crown and the gingival bleeding index:** The statistical study revealed the existence of a significant relationship between the marginal adaptation of the crown and the gingival bleeding index. This was noticed from the increased incidence of gingivitis in cases of maladaptation of the crown. This can be seen in Table 1.

**The relationship between the type of prosthesis and the gingival bleeding index:** Find the value of Spearman correlation coefficient we experience. We find it during the test on the following SPSS20 application program (Table 2).

| Bleeding index | Gingival bleeding index | Maladapted | Well fit | Total |
|----------------|-------------------------|------------|----------|-------|
| Mild gingivitis| Count GBI% within       | 4 (6.5%)   | 58 (93.5%)| 62 (100.0%) |
| Moderate gingivitis| Count GBI% within     | 74 (61.7%) | 46 (38.3%)| 120 (100.0%) |
| Severe gingivitis| Count GBI% within       | 11 (100.0%)| 0 (0.0%)  | 11 (100.0%)  |
| Total         | Count                   | 89         | 104      | 193   |
|               | GBI within (%)          | 46.1       | 53.9     | 100.0 |
Table 2: The relationship between the type of prosthesis and the gingival bleeding index

| Spearman’s rho | Correlations | GBI | Types of prosthesis |
|----------------|--------------|-----|---------------------|
| GBI            | Correlation coefficient | 1.000 | 0.110 |
|                | Sig. (2-tailed)         | 0.128 |
|                | N                        | 193  | 193 |
| Type of prosthesis | Correlation coefficient | 0.110 | 1.000 |
|                | Sig. (2-tailed)         | 0.128 |
|                | N                        | 193  |

Table 3: Cross tabulation: degree of recession* marginal adaptation of the crown

| Parameters          | Marginal adaptation of the crown | Degree of recession |
|---------------------|----------------------------------|--------------------|
|                     | Count marginal adaptation (%)    | 0 | Class 1 | Class 2 | Class 3 | Total |
| Maladapted          | within                          | 35 (39.3%) | 39 (43.8%) | 14 (15.7%) | 1 (1.1%) | 89 (100.0%) |
| Well fit            | within                          | 98 (94.2%) | 6 (5.8%) | 0 (0.0%) | 0 (0.0%) | 104 (100.0%) |
| Total               | Count marginal adaptation (%)    | 133 (68.9%) | 45 (23.3%) | 14 (7.3%) | 1 (0.5%) | 193 (100.0%) |

Table 4: The relationship between the type of prosthesis and the degree of gingival recession

| Spearman’s rho | Correlations | Gingival recession | Type of prosthesis |
|----------------|--------------|--------------------|---------------------|
| Gingival recession | Correlation coefficient | 1.000 | 0.010 |
|                | Sig. (2-tailed)         | 0.895 | 0.895 |
|                | N                        | 193  | 193 |
| Type of prosthesis | Correlation coefficient | 0.010 | 1.000 |
|                | Sig. (2-tailed)         | 0.895 |
|                | N                        | 193  |

Table 5: Cross tabulation: Gingival bleeding index*degree of recession

| Parameters          | Gingival bleeding index | Degree of recession |
|---------------------|-------------------------|--------------------|
|                     | No recession | Recession class 1 | Recession class 2 | Recession class 3 | Total |
| Mild gingivitis     | Count GI (%) within    | 60 (96.8%) | 2 (3.2%) | 0 (0.0%) | 0 (0.0%) | 62 (100.0%) |
| Moderate gingivitis | Count GI (%) within    | 70 (58.3%) | 42 (35.0%) | 8 (6.7%) | 0 (0.0%) | 120 (100.0%) |
| Severe gingivitis   | Count GI (%) within    | 3 (27.3%) | 1 (9.1%) | 6 (54.5%) | 1 (9.1%) | 11 (100.0%) |
| Total               | Count GI (%) within    | 133 | 45 | 14 | 1 | 193 |

We note that the value of the link Spearman coefficient of 0.110 means that correlation of about 11% between them which is not an acceptable value because the value of the probability of significance (sig.) (0.128) is greater than the significance level (0.05) and thus accept the null hypothesis which says that there is no significant relationship between the type of prosthesis used and the bleeding index.

The relationship between the marginal adaptation and the degree of recession: The results showed the existence of a significant relationship between the marginal adaptation and the degree of recession where it was found that gingival recessions were lower in cases where the marginal adaptation of the prosthesis well fit. Conversely, gingival recessions, particularly class 1 and 2 according to Miller, were found to increase in cases of marginal maladaptation of the prosthesis. This can be seen in Table 3.

The relationship between the type of prosthesis and the degree of gingival recession: We note that the value of the link Spearman coefficient of 0.010 means that correlation is very weak between them which is not an acceptable value because the value of the probability of significance (sig.) (0.895) is greater than the significance level (0.01) and thus accept the null hypothesis which says that there is no significant relationship between the type of prosthesis and the degree of gingival recession (Table 4).

The relationship between the degree of gingival recession and the gingival bleeding index: The results revealed the existence of a significant relationship between the degree of recession and the bleeding index where the incidence of gingival recessions around the crowns was lower in cases of slight gingivitis of the first degree and tended to increase when the gingivitis was mild or severe (Table 5).

DISCUSSION

The percentage of the crowns rounded with no gingival recession occurred was (68.9%) compared to (31.1%) of the crowns examined around which gingival recession occurred. The later group can be subdivided according to Miller’s classification (class 1 (23.3%), class 2 (7.3%) and class 3 (0.5%).

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The statistical study revealed a significant relationship between the marginal adaptation and the gingival bleeding index. This was noticed in the form of an increase in gingivitis around the prostheses with marginal maladaptation of the crown.

Our results corroborated those of El Mowafy who studied the effect on the gingival response of the metal alloy used in the fabrication of the metal-ceramic crowns. His study concluded that the main reason for the undesirable gingival response was the poor marginal adaptation of the crowns. Moreover, he was unable to rule out the possibility of such a reaction being a result of the constituents of the metal alloy although its overall contribution is minimal and can not be regarded as the main cause for such a response. Likewise, our results were similar to those obtained by Mariana and Doseva who conducted a clinical study of the relationship between the position of the crown margins and the gingival response. The results of their study concluded that crowns double the incidence of gingivitis proximal to the abutments, especially in cases of poor marginal adaptation and rough surfaces.

Given that the amount of marginal adaptation can now be accurately measured using a microscope, a contradiction surfaced regarding the concept of the perfect crown margins. Since, the size of the bacteria is between 1-5 microns, thus, the presence of 200 microns of open margins allows for the accumulation of bacteria. The marginal adaptation is considered good depending on the sensory perspective of the dentist as he or she can sense any gap/defect up to 39 microns in the marginal adaptation of the crown.

Conversely and until this day we still come across crowns that have been placed 15 years ago and did not cause any periodontal destruction. This indicates that the virulence of the bacteria and the immune response of the body to it play a major role in the degree of gingivitis present. Thus, it has become mandatory that dentists should aspire to secure the best marginal adaptation possible to lessen the accumulation of plaque and the undesirable reactions of the gingiva, in addition to advising the patients on good oral hygiene practices.

Any type of prosthesis whether-metal-ceramic or metal-free zirconium did not affect the incidence or absence of gingival recession and did not increase the gingival bleeding index or the degree of ensuing gingivitis. These findings were contradictory to those of El Mowafy because he could not rule out that the undesirable gingival response was a result of some of the constituents of the metal alloy being used.

The incidence of gingival recession, especially classes 1 and 2 according to Miller increased around the prostheses with maladapted margins. Conversely, the incidence of gingival recessions was lower in cases where the margins were well fitted to the prosthesis.

CONCLUSION

Poor marginal adaptation of the crown increase the incidence of undesirable gingival response. the type of prosthesis does not adversely affect the health of periodontal tissues. And the gingival recession around crowned teeth increase with increasing degree of periodontal infections.

REFERENCES

01. AL-Wahadni, A.M., Y. Mansour and Y. Khader, 2006. Periodontal response to all-ceramic crowns (IPS Empress) in general practice. Int. J. Dent. Hyg., 4: 6-41.
02. Sjogren, G., R. Lantto and A. Tillberg, 1999. Clinical evaluation of allceramic crowns (Dicor) in general practice. J. Prostheth. Dent., 81: 277-284.
03. Giollo, M.D., P.M. Valle, S.C. Gomes and C.K. Rosing, 2007. A retrospective clinical, radiographic and microbiological study of periodontal conditions of teeth with and without crowns. Braz. Oral. Res., 21: 348-354.
04. Reitemeier, B., B. Reitemeier, K. Hansel, M.H. Walter, C. Kastner and H. Toutenburg, 2002. Effect of posterior crown margin placement on gingival health. J. Prosthet. Dent., 87: 167-172.
05. Valderhaug, J., J.E. Ellingsen and A. Jokstad, 1993. Oral hygiene, periodontal conditions and carious lesions in patients treated with dental bridges. A 15-year clinical and radiographic follow-up study. J. Clin. Periodontol., 20: 482-489.
06. Felton, D.A., B.E. Kanoy, S.C. Bayne and G.P. Wirthman, 1991. Effect of in vivo crown margin discrepancies on periodontal health. J. Prostheth. Dent., 65: 357-364.
07. De Backer, H., G. Van Maele, N. De Moor, L. Van den Berghe and J. De Boever, 2006. An 18-year retrospective survival study of full crowns with or without posts. Int. J. Prosthodontics, 19: 136-141.
08. Ainamo, J. and I. Bay, 1975. Problems and proposals for recording gingivitis and plaque. Int. Dent. J., 25: 229-235.
09. Chadha, G.M., P. Kakodkar, V. Chaugule and V. Nimbalkar, 2012. Dental survey of institutionalized children with autistic disorder. Int. J. Clin. Pediatr. Dent., 5: 29-32.
10. Dimova, M. and V. Doseva, 2006. Changes in correlations between cervical crown edge and marginal gingiva in fixed prosthodontics. J. IMAB, 12: 45-46.
11. El-Mowafy, O., 2008. Gingival response to crowns: A counterpoint. J. (Can. Dent. Assoc.), 74: 803-804.