Evaluation of Gingival Status of Two Finishing Lines of Veneer Restoration – Horizontal and Vertical Lines with Gingittage – A Comparative Clinical Study

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Abstract
Background The apical migration from the free gingival margin is the main complication in the definitive prosthetic restoration and it affects the esthetic appearance of the restorations. **Objectives** this comparative study aims to evaluate and compare the periodontal health between teeth treated with a horizontal finishing line for its prosthetic crowns and feather edge vertical finishing line with gingittage. **Materials and Methods** A total of 60 veneer restorations on 6 patients have been assessed periodontally the group A include 3 patients with 10 maxillary anterior veneers prepared with a shoulder horizontal finishing line for each patient and the group B included 3 patients each patient with 10 maxillary anterior with feather edge vertical finish line with gingittage, the periodontal health was assessed before preparation and after 6 months for follow up. **Results** There was a significant difference between the two approaches of tooth preparation relating to periodontal health as plaque index, and bleeding index, as the mean of PI was (23.5%) in group A while (20.1%) in group B, The BI was found to be (26.5%) in group A, while the mean of BI in group B was (24.1%), and after 6 months the mean of PI was (35.8%) in group A while (6.6%) in group B, the BI was found to be (42.5%) in group A, while the mean of BI in group B was (9.1%), .but there was no significant difference in the mean of gingival recession in both groups as it was (30%) in group A and (26.6) in group B and after 6 month is was (33.3%)in group A and (26.6) in group B. **Conclusion** the results of the current study showed that the feather edge vertical preparation with gingittage was promising as it showed fewer signs of gingival inflammation, and more stability in the surrounding tissue of the prosthesis. The clinician can achieve a better esthetic outcome of the veneers and better gingival health in a long-term prognosis.

Keywords: Feather edge vertical finishing line; gingittage; horizontal finishing line; veneers.

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Introduction

The unacceptable look of the restorations caused by the recession of the free gingival margin is the main problem for veneers and crowns (Orkin et al, 1987). This can finally expose the veneer-to-tooth contact and make the prosthetic unsuccessful, especially in the anterior region. Gingival recession around veneers has been extensively evaluated, and a lot of etiologic factors have been mentioned, including extremely subgingival placement of the veneer margin, and iatrogenic gingival tissue damage during teeth preparation, marginal inaccuracy, over contouring horizontally, and a thin and scalloped gingival biotype. The exact level of placement of the margin of veneers has attracted a lot of argument. Reitemeier et al, (2002) discovered increased plaque accumulation around margins of veneers and hence poor gingival tissue health. Similar experiences have been reported by others (Valderhaug et al, 1993). Kuwata, (1979) classified the finishing line of tooth preparation by the point of view of the angle of margin. He classified the angle margin between 0 and 30 degrees as a bevel, from 31 to 60 degrees as a chamfer, and 61 to 90 degrees as a shoulder. A more practical classification for sorting the geometry of the finishing line was later suggested which was broadly divided into two main types: vertical and horizontal (Pardo, 1982). The variation between tooth preparations horizontally and vertically is that in the horizontal finishing line the margin is placed by the operative and makes a well-defined geometry on the tooth margin after that replicated in the impression of teeth and the working cast. This may be the reason that makes dentists favor horizontal preparations. For vertical tooth preparations, the margin placement is created by the laboratory technician on the information of gingival tissue. The main aim of a teeth preparation process is to remove diseased parts of the tooth and/or healthy tooth components and to reshape a tooth to receive a prosthetic. One of the most common incisal preparation designs is feathered-edge (Chai et al, 2018). The quantity of tooth structure preparation is related to the selected restorative material, and the exact clinical condition allows adequate space to make tolerable mechanical strength of the final prosthesis, satisfactory occlusal anatomy, and good-looking aesthetics (Goodacre et al, 2001). The ability to control the reduction of tooth structure in a precise and measurable way during the preparation of ceramic veneers is a clinical challenge (Silva et al, 2020). Nowadays, the dentists and the technician have good materials and also procedures that make it probable to restore esthetics and function in a better and more liable way. All-ceramic new-generation prosthesis and adhesive materials allow better maintenance of residual hard tooth components, especially for single components (Edelhoff & Brix, 2011). Lithium disilicate restorations with feather-edge finishing lines have clinical results like other margin designs (Schmitz et al, 2016). This study aims to compare the results of the gingival health between the teeth prepared with feather edge vertical finishing line and gingittage with teeth prepared by the horizontal finishing line.

Patients and Methods

A comparative study was performed to assess the periodontal health of 6 patients, a total of 60 veneers for upper anterior teeth including incisors, canines, and premolars were selected for the study. As ethical consideration informed patient consent was taken from all the subjects in this study. The patients were divided into two groups (30 teeth with horizontal finishing line as group A and 30 teeth with feather edge

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vertical finish line and gingittage as group B, and the patients were sub-classified as subgroups A1, A2, and A3 for group A and B1, B2, and B3 for group B). The study was carried out between August 2020 to July 2021 at Duhok educational dental center, and the Periodontology department at the college of dentistry, Duhok University. The GI, BI, and gingival recession were taken before starting the procedure. Every single tooth that is proposed to be prepared for veneer is gently probed with a periodontal probe at four sites (mesial, distal, buccal, and lingual surfaces), gingival bleeding is recorded as present or absent and the gingival plaque index is recorded as present or absent, the number of sites where recorded is divided by the sites were examined and multiplied by 100 to give the percentage (Ainamo & Bay, 1975).

Figure (1): (a) Group A patient preoperative intra-oral photo, (b) group A Patient after horizontal finishing line teeth preparation, (c) Group B patient preoperative intra-oral photo (d) Group B patient periodontal assessment of group b patient.

Figure (2): Komet 6862D/012 bur. Like periodontal probe, has the same reference marking.

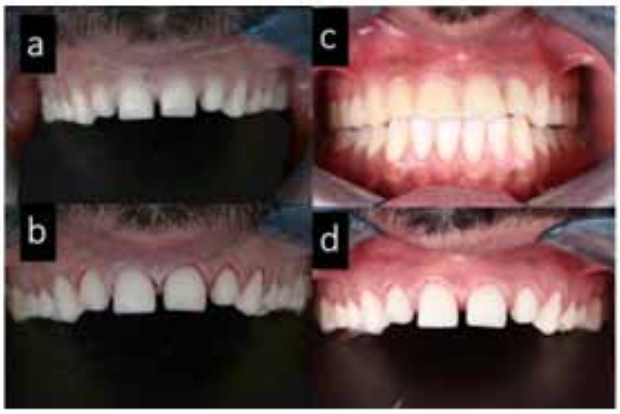

Figure (3): (a) Feather edge vertical preparation (b) Gingittage of the gingival sulcus (c) Temporary restoration after 11 days (d) After removing the temporary to take impression.

Figure (4): (a) Follow up of the horizontal finishing line patient after 6 month, (b) Follow up of the vertical finishing line patient after 6.

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The gingival recession is recorded using miller's classification for recession. The reduction of tooth structure started after the sulcus depth measurement using William›s periodontal probe. The preparation for group A was done with a shoulder line horizontal finishing line. The preparation extended 1 mm subgingivally from the gingival margin regardless of probing depth to avoid any violation of the biologic width as shown in figure (2). For group B patients the preparation was feather edge finishing line, the depth of preparation was controlled by using a specifically designed laser-marked bur (Komet 6862D/012) each bur has the same reference marks as a periodontal probe, where the first black mark begins with 1 mm from the tip and is readily visible throughout the entire preparation process as shown in figure (2). After tooth preparation, a rotary curettage of the gingival sulcus (gingittage) was performed in vertical feather edge preparation. Fine-grit diamond bur is used to refine and smooth the preparation surface for feather edge design. The immediate temporary veneers were placed immediately to prevent collapsing soft tissue gingival margin on the prepared tooth surface. The margin of provisional veneers placed 1 mm within the subgingival sulcus as shown in figure (3). The gingittage led to blood clot formation and enhance the healing process. for feather edge preparation after 10-15 days of tooth preparation, the final impression was taken using polyether impression material after 10-15 days of tooth preparation as shown in figure (5), while for shoulder horizontal preparation the impression was taken immediately after tooth preparation. The restorative material for the final veneers was lithium disilicate. The definitive veneer margin was assessed to be ensured that is placed within 1 mm subgingivally. The Inclusion criteria were volunteer patients with a periodontally healthy tooth, good general health with no systematic disease, and all patients were above 18 years old. Also, patients with systematic diseases and those on anticoagulant therapy were excluded from this study.

Table (1): Periodontal assessments before veneer placement in group A patients.

Patient number	PI %	BI %	Recession %
A-1	22.5%	27.5%	60%
A-2	27.5%	30%	20%
A-3	20%	22.5%	10%
Mean	23.3%	26.6%	30%

Table (2): Periodontal assessments before veneer placements in group B patients.

Patient number	PI %	BI %	Recession %
B-1	22.5%	25%	30%
B-2	20%	22.5%	20%
B-3	20%	25%	30%
Mean	20.1%	24.1%	26.6%

Table (3): periodontal assessment after 6 months of veneer placement in group A patients.

Patient number	PI %	BI %	Recession %
A-1	32.5%	47.5%	60%
A-2	37.5%	35%	20%
A-3	37.5%	45%	20%
Mean	35.8%	42.5%	33.3%

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Table (4): Periodontal assessment after 6 months of veneer placement in group B patients.

Patient number	PI %	BI %	Recession %
B-1	7.5%	10%	30%
B-2	10%	7.5%	20%
B-3	12.5%	10%	20%
Mean	6.6%	9.1%	26.6%

Statistical Analysis

Unpaired Student t-test was used for Plaque Index, bleeding index, for recession incidence Pearson's chi-square was used.

Results

This study included 6 patients (divided into two groups each group had 1 male and 2 female). For each patient, a total of 10 veneers were placed as shown in figure (7). The periodontal health of each patient was assessed before starting the preparation as shown in tables (1 and 2). As shown in the tables there was no significant difference between the periodontal health of the two groups, both groups had good oral hygiene. The PI, BI, and recession mean of group A was (23.3%) (26.6%), (30%) respectively and for group B was (20, 1%), (24, 1%), (26, 6%) respectively. After 6 months of veneer placement, each patient was re-evaluated for the same periodontal scores. There was a significant difference between the two approaches of tooth preparation relating to periodontal health as plaque index, and bleeding on probing as shown in table (3) and table (4), the mean of PI was (35.8%) in group A while (6.6%) in group B, the BI was found to be (42.5%) in group A, while the mean of BI in group B was (9.1%), but there was no significant difference in the mean of gingival recession in both groups as it was (33.3%) in group A and (26.6%) in group According to the results we had the PI and BI of group B patients was better than Group A patients and this indicating the patient with feather edge vertical preparation have better gingival and periodontal stability and better esthetic appearance than horizontal finishing line as shown in figure (4).

Discussion

The center of our study is gengittage which is the curettage of the gingival sulcus, this protocol as described by many authors is developed by Ingaham et al, (1981) as the removing of the soft tissue of the sulcus wall simultaneously while the tooth prepared by chamfer finishing line on tooth structure. Three factors determine the appropriateness of this procedure which is: an absence of bleeding on probing, a sulcus depth less than 3 mm, and an adequate amount of keratinized tissue. The soft tissue of the gingiva is significantly affected by the approach of tooth preparation and it will define the accuracy of the final prosthesis. The correct way for this procedure is important to do an adequate gingival and periodontal assessment to confirm the gap between the bone margin and restoration to avoid violating the periodontal apparatus (Peris et al, 2019). This protocol will make appropriate managing of the subgingival part of the prosthesis. A lot of experimental research showed that the featheredge veneer preparation has less marginal inaccuracy compared to other preparation methods (Comlekoglu et al, 2009). Also, a bigger gap will cause more extrusion of cement that will interact with the gingival sulcus wall. In the horizontal preparation design, the clinician faces many challenges that will lead to a negative outcome for the prosthesis and the surrounding periodontium, such as a large gap between the tooth finishing line and the prosthesis, over contouring, and

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under contouring of the prosthetic material. The well-defined border of the gingiva that is made by the healing process after gingittage around temporary restoration will make the technician make the restorations 1 mm subgingivally without violation of the biological width, the gap between restoration and tooth will decrease, that will prevent extrusion of cement material or any space between them. These factors will make the veneers look better esthetic, and more stable gingiva and surrounding periodontium. In our study that is presented in this paper even, it included a small number of cases there was a difference in the outcomes of both horizontal and vertical finishing lines relating to the periodontal health.

Conclusion

Despite the limitations of this study for follow-up and the small number of patients, the results of the feather edge vertical preparation with gingittage were promising as it showed fewer signs of periodontal inflammation, and more stability in the surrounding tissue of the prosthesis. The clinician can do a better esthetic outcome of the veneers and better gingival health in the long term prognosis. We recommend further study with a large number of the cases and a longer time for follow-up relating to the periodontal health around the prosthesis.

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