

Effect of Prefibrillated Post on Periodontal Indexes of Patients Undergoing Dental Prosthesis

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Abstract

Objective: To analyze the effect of prefibrillated post on periodontal indexes of patients undergoing dental prosthesis. **Methods:** From February 2021 to December 2023, 100 patients who received oral prosthesis treatment in a health service center were selected for a group study. The group was divided into control group and study group with 50 cases in each group. The control group was treated with plastic fiber post, while the study group was treated with prefibroblast post. The effect of prefibroblast post was comprehensively evaluated from three aspects: improvement of periodontal indexes before and after treatment, changes of cytokine levels in gingival creval fluid and incidence of adverse reactions. **Results:** Before treatment, there were significant differences in all indexes between the two groups ($P > 0.05$). After treatment, BI, PD, PLI indexes, IL-6 and PGE2 levels were compared between the two groups. T-test showed significant differences between the two groups ($P < 0.05$), and the study group was lower than the control group. The incidence of adverse reactions between the two groups was significantly different ($P < 0.05$) by χ^2 test, and the study group was lower than the control group. **Conclusion:** Both plastic fiber post and pre-fiber post can effectively improve the periodontal indexes of patients, but the effect of pre-fiber post is more ideal, safer and more reliable.

Keywords

Preformed fiber pile; Plastic fiber post; Oral prosthetics; Periodontal index

1. Introduction

Oral restoration refers to the restoration of the function and appearance of oral tissues, teeth, and surrounding structures through various means, aiming to help patients regain dental health and improve chewing function [1]. There are many materials used in oral restoration, among which metal posts are traditional restoration materials. Although they can achieve certain restoration effects, they are hard and are very likely to cause root splitting. They also have poor biocompatibility and may interfere with patient examinations, such as magnetic resonance imaging, so they have obvious limitations [2]. Both plastic fiber posts and prefabricated fiber posts are non-metallic materials. Both groups of materials have high biocompatibility and are beautiful, which can better meet the needs of patients. Studies have shown that prefabricated fiber posts can effectively improve patients' periodontal indicators and help maintain patients' oral health [3]. This article analyzes the effects of prefabricated fiber posts on periodontal indicators in patients undergoing oral restoration treatment, and the specific report is as follows.

2. Subjects and Methods

2.1 Subjects

One hundred patients who underwent restorative dental treatment at a health service center between February 2021 and December 2023 were selected for a randomized, computer-generated study. The control group consisted of 28 males and 22 females, ranging in age from 23 to 66 years (mean, 42.75 ± 8.14 years). The study group consisted of 26 males and 24 females, ranging in age from 22 to 65 years (mean, 41.68 ± 8.37 years). Comparison of relevant

basic information confirmed comparability ($P > 0.05$). Patients were fully informed of the study procedures and objectives and signed consent. This study has been approved by the Medical Ethics Committee.

2.2 Methods

Before the start of restorative treatment, both groups underwent X-ray examinations to assess the gingiva, periodontal tissue, and dentition defects. The oral cavity was then cleaned, and the root canals, residual roots, and crowns were removed to fully expose the root canals.

The control group underwent restorative treatment with a plastic fiber post. An appropriate fiber post was selected based on the predicted root canal length and inserted into the root canal. The position was gradually adjusted according to the patient's occlusal position. Light fixation was performed for 20 seconds to maintain the crown shape. After the fiber post was removed, light fixation was performed for another 40 seconds to maintain the root morphology. After surface preparation of the root and fiber post, resin adhesive was applied, and light fixation was performed for another 40 seconds to secure the restoration within the root canal. The restoration was then fitted with an all-ceramic crown and adjusted as appropriate. Finally, polishing and bonding were performed. The research group used fiber posts for restorative treatment. Patients were required to prepare the root surface and root canal first, then select a suitable prefabricated fiber post, perform routine acid etching, clean the prefabricated fiber post, and remove moisture from the root canal. The adhesive was applied to the tooth, the root canal bonding surface, and the fiber post surface. After application, light curing was performed. An appropriate amount of post and core resin was injected into the prepared root canal. Finally, the fiber post was placed in the root canal and light cured. After hardening, the all-ceramic crown restoration was combined and adjusted as appropriate. The operation was completed. The two groups of patients were observed for 1 month after restoration, and relevant indicators were tested and recorded.

2.3 Observation indicators

Comparison of periodontal indicators before and after treatment: indicators include gingival bleeding index (BI), probing depth (PD), and plaque index (PLI). (1) BI: Scoring range is 0-3 points, 0 points means no bleeding, 1 point means mild bleeding, 2 points means moderate bleeding, and 3 points means severe bleeding; (2) PD: mainly refers to the depth of the periodontal probe inserted between the gum and the tooth; (3) PLI: the four tooth surfaces of the tooth to be tested need to be tested, namely the mesial buccal surface, medial buccal surface, distal buccal surface, and lingual surface, with a scoring range of 0-3 points, 0 points means no plaque, 1 point means mild plaque, 2 points means moderate plaque, and 3 points means more plaque.

Comparison of adverse reactions: including gingivitis, infection, root fracture, and post and core loosening; **Comparison of cytokines in gingival crevicular fluid before and after treatment:** including interleukin 6 (IL-6) and prostaglandin E2 (PGE2). Before and after treatment, 3 ml of gingival crevicular fluid was collected from the patient in a fasting state, and serum was obtained after low-temperature centrifugation. The serum was tested by enzyme-linked immunosorbent assay.

2.4 Statistical Analysis

The results of this study were analyzed using SPSS 21.0 statistical software. Periodontal parameters were expressed as (\pm s), and t-tests were used for comparison between groups. Adverse reaction rates were expressed as (%), and χ^2 tests were used for comparison between groups. $P < 0.05$ was considered statistically significant.

3. Results

3.1 Comparison of Periodontal Indices Before and After Treatment

There were 50 patients in each of the control and study groups. Before treatment, the control group had BI (2.23 ± 0.46), PD (4.28 ± 0.57) mm, and PLI (2.12 ± 0.45) scores, while the study group had BI (2.21 ± 0.44), PD (4.32 ± 0.58) mm, and PLI (2.16 ± 0.43) scores. Before treatment, no significant differences in periodontal indices were observed between the two groups ($t_1=0.222$, $P_1=0.825$, $t_2=0.348$, $P_2=0.729$, $t_3=0.454$, $P_3=0.651$, $P > 0.05$); BI (1.15 ± 0.36) points, PD (1.97 ± 0.26) mm, PLI (1.01 ± 0.24) points in the control group, BI (0.98 ± 0.38) points, PD (1.69 ± 0.23) mm, PLI (0.74 ± 0.51) points in the study group. After treatment, the BI, PD, and PLI indicators in the study group were significantly better than those in the control group. The t test showed significant differences

between the two groups ($t_1=2.297$, $P_1=0.024$, $t_2=5.704$, $P_2=0.001$, $t_3=3.387$, $P_3=0.001$, $P<0.05$).

3.2 Comparison of Adverse Reactions Between the Two Groups

In the control group, there were 2 cases of gingivitis (4.00%), 2 cases of infection (4.00%), 1 case of root fracture (2.00%), and 3 cases of post and core loosening (6.00%), for a total incidence of 16.00%. In the study group, there were 1 case of gingivitis (2.00%), 1 case of infection (2.00%), 0 cases of root fracture, and 1 case of post and core loosening (2.00%), for a total incidence of 6.00%. Compared with the control group, the study group had a significantly lower total incidence of adverse reactions. The χ^2 test showed a significant difference between the two groups ($\chi^2 = 5.107$, $P = 0.024$, $P < 0.05$).

3.3 Comparison of Gingival Crevicular Fluid Cytokine Levels Between the Two Groups Before and After Treatment

Before treatment, the control group had IL-6 (32.12 ± 3.11) $\text{ng} \cdot \text{L}^{-1}$ and PGE2 (24.85 ± 3.76) $\mu\text{g} \cdot \text{L}^{-1}$, while the study group had IL-6 (32.75 ± 3.64) $\text{ng} \cdot \text{L}^{-1}$ and PGE2 (24.90 ± 3.58) $\mu\text{g} \cdot \text{L}^{-1}$. Before treatment, there was no significant difference in the gingival crevicular fluid cytokine levels between the two groups ($t_1=0.931$, $P_1=0.825$, $t_2=0.068$, $P_2=0.946$, $P>0.05$); IL-6 (12.75 ± 1.68) $\text{ng} \cdot \text{L}^{-1}$, PGE2 (9.74 ± 1.39) $\mu\text{g} \cdot \text{L}^{-1}$ in the control group, IL-6 (11.65 ± 1.64) $\text{ng} \cdot \text{L}^{-1}$, PGE2 (8.92 ± 1.13) $\mu\text{g} \cdot \text{L}^{-1}$ in the study group. After treatment, the levels of cytokines in the gingival crevicular fluid of the study group were lower than those in the control group. The t test showed that the differences between the two groups were significant ($t_1=3.313$, $P_1=0.001$, $t_2=3.237$, $P_2=0.002$, $P<0.05$).

4. Discussion and Conclusion

Oral restoration plays an important role in oral medicine. Oral restoration treatment can help patients restore their chewing function caused by tooth loss, damage or disease, thereby improving their eating problems and improving their quality of life [4]. In addition, oral restoration treatment can also repair problems such as tooth decay, caries, and worn teeth to prevent the spread of infection and help reduce the risk of oral diseases. Fiber posts are currently a commonly used material for oral restoration treatment. They are made of fiber-reinforced materials and are usually used to repair damaged tooth roots and provide support for fixed restorations [5]. Compared with traditional metal oral restoration materials, fiber posts have stronger flexibility and elasticity, better biocompatibility, higher aesthetics, and better bonding properties. Their treatment effect is significant and they are highly favored in clinical practice. Plastic fiber posts and prefabricated fiber posts are the most commonly used types of fiber posts.

As the name suggests, plastic fiber posts have good plasticity and can be plastically changed according to clinical operation requirements to adapt to tooth root canals of different shapes and sizes, with a wider range of applications [6]. However, their strength and stability are relatively low, so they are more limited when performing larger restorations or bearing heavy loads. Prefabricated fiber posts are usually made of fiber-reinforced materials, such as carbon fiber and glass fiber. They have many advantages, such as strong bonding and elasticity, good support, better retention of tooth structure, and higher biocompatibility [7]. In addition, because prefabricated fiber posts are prefabricated semi-finished posts, the surgical operation process is reduced, which can effectively shorten the patient's treatment time and help reduce the patient's pain. This study found that compared with the control group, the BI, PD, and PLI indicators of the study group were significantly more advantageous after treatment, and the total incidence of adverse reactions was lower ($P < 0.05$). This shows that compared with plastic fiber posts, prefabricated fiber posts are more similar to the patient's physiological and anatomical morphology, can perfectly fit with the periodontal tissue, and have a better root canal bonding degree, which helps to promote the recovery of patients' tooth lesions and damage. At the same time, prefabricated fiber posts reduce trauma to the periodontal tissue and improve the safety of oral restoration treatment for patients. In addition, this study also found that the IL-6 and PGE2 levels of the two groups of patients were significantly different ($P < 0.05$), and the levels of the study group were lower than those of the control group. IL-6 and PGE2 are both key indicators of gingival crevicular fluid cytokines, and their levels can reflect the inflammatory lesions of periodontal tissues. Under the influence of periodontal lesions, IL-6 levels will increase, thereby promoting the aggregation of immune cells and causing swelling, erythema, and bleeding in the gingival tissue. PGE2 is an important prostaglandin that can stimulate vasodilation and the forward migration of inflammatory cells. When the periodontal tissue is infected with bacteria, it will stimulate macrophages to produce PGE2. Elevated levels indicate increased vascular permeability and inflammatory cell infiltration, which may lead to swelling, bleeding, and other conditions in the gingival tissue. Studies have shown that the production of IL-6 and PGE2 can promote inflammatory reactions and bone resorption, leading to

the destruction of gingival tissue and the formation of periodontal pockets, further aggravating the development of periodontal lesions, and ultimately leading to loose teeth and alveolar bone loss [8]. Therefore, reducing the activity of IL-6 and PGE2 is of great significance in the control of periodontal lesions. The study group had lower IL-6 and PGE2 levels than the control group, suggesting that prefabricated fiber posts can effectively alleviate periodontal inflammation, thereby reducing periodontal lesions after oral restoration treatment, and are of great value in ensuring the effectiveness of restorative treatment.

In summary, while there are many restorative treatment options, prefabricated fiber posts offer significant advantages, effectively improving periodontal markers, controlling periodontal inflammation, ensuring safety, and demonstrating significant efficacy.

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