

CO-RELATIONSHIP BETWEEN FIXED PROSTHODONTICS AND COMMON GUM ISSUE***Dr. Farman Shinwari**

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Abstract

This article describes a common gum issue that occurs as a result of fixed prosthodontics therapy, this common gum issue is called gum inflammation (gingivitis). Effective oral hygiene practices can help reduce gingival inflammation, even if improper crown and bridge margins can contribute to biofilm development, gingival sulcus fluid flow, and alveolar bone loss. These conditions can result in micro leakage, recurrent caries, and fixed dental prosthesis failure. The article highlights how the preparation of crown, contour, and appearance of fixed dental restorations can impact the surrounding gingival tissues. Rough, irregular surfaces and marginal gaps create a favorable environment to bacterial colonization and plaque formation. Additionally, the impression quality and internal fit of the dental prosthesis are critical for retention and longevity. Supragingival crown margins are shown to have more favorable effects on the gingival tissues compared to subgingival crown margins. The research highlights the significance of identifying the biologic width, which is roughly 2 mm, and suggests preserving at least 3 mm of intact tooth structure between the alveolar bone and the dental prosthesis edge. Failure to maintain these dimensions can lead to increased gum inflammation, attachment loss, and gingival recession, finally impacting the success and longevity of the fixed dental prosthesis.

Keywords: Fixed Prosthodontics, Fixed dental restorations, Fixed partial denture, Crown, Common gum Issue (gingivitis).**INTRODUCTION**

The most public gum issue that occurs during the fixed Prosthodontics therapy are gum inflammation and periodontal inflammation. Gum inflammation also known as the gingivitis occurs much earlier than the periodontal inflammation [1]. The best way to treat gingival inflammation is to follow the guidelines for proper oral hygiene, which include cleaning your natural and artificial teeth twice a day, flossing your teeth frequently, cleaning your teeth with mouthwash, and visiting the dentist [2]. An insufficient artificial crown and fixed partial denture retainer edges, gingival sulcular fluid entry beneath the prosthesis, and alveolar bone loss all contribute to the formation of biofilm, which can cause tiny leaks, frequent dental cavities, periodontium issues and finally the fixed dental restorations' failure [3]. The alveolar bone, periodontal ligaments, cementum and gingiva are among the periodontal tissues, when this tissue becomes inflamed, it is called periodontitis [4]. In addition, the gingival tissues and prosthesis may be impacted by the preparation of margin and appearance shape of fixed dental restorations, On the other hand, poorly constructed fixed prosthodontics-related restorations may negatively impact oral health tissues or aggravate pre-existing periodontal situations like gingival inflammation, periodontitis, and occlusal trauma [5]. Rough and irregular surfaces of fixed dental restorations generate a desirable situation for microbial colonization and plaque formation [6-7]. A favorable environment for plaque deposition can be produced by marginal gaps, which can lead to the growth of dental cavities, gingivitis and problems of periodontium [8]. Impression or internal surface of a fixed dental prosthesis is important for resistance and retention of prosthesis. The success and longevity of the fixed dental prosthesis will be increased by having the best-adapted one.

An improperly shaped impression or the internal surface of fixed dental prosthesis may potentially prevent the prosthesis from fully seating, leading to an exposed edge [9]. The artificial crown placed on supragingival margins has shown advantageous effects on health of the surrounding periodontal tissue [10]. However, the marginal adaptability is reported to have an essential persistent influence on the effectiveness of fixed dental restorations and that marginal discrepancy had a undesirable effect on the periodontal tissue healthiness, however, exact dimensions are difficult to achieve [10,11]. Furthermore, it was demonstrated by Flores-de-Jacoby et al. that subgingival margins exhibited higher probing depths and biofilm formation than supragingival margins [12]. More spirochetes, fusiforms, rods, and filamentous bacteria were found in the microbial biology of such subgingival margins with marginal disagreement [13-14]. The gingival sulcus is coronal to the biologic width and measures, on average, 0.69 mm [15]. Dental professionals should ideally follow the gingival contour when placing margins for fixed prostheses, extending no more than 0.5 mm into the sulcus [16-17-18]. Similarly, when reconstruction the gum level, periodontists utilize the biologic width's measurements [19]. Since a natural width of 2 mm has been broadly accepted, it has been proposed that a minimum of 3 mm of healthy tooth structure be kept between the fixed dental prosthesis edge and alveolar bone [20]. Increases in gingival recession, attachment loss [21, 22, 23, and 24], and gum inflammation are commonly seen [25, 26, and 27] in circumstances when these dimensions cannot be met.

Prosthodontics

Prosthetics refers to the skill and knowledge of replacing missing body parts, while prosthesis refers to any non-natural or artificial body part. The terms prosthodontics and dental prosthesis are used in relation to dentistry [28]. The specialty area of dentistry known as prosthodontics deals with the replacement of missing teeth and oral tissues in order to

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preserve and restore the structure, function, appearance, and health of the mouth. Prosthodontics is divided into three primary categories: maxillofacial prosthodontics, removable prosthodontics, and fixed prosthodontics [28].

Fixed Prosthodontics: That skill and knowledge which reestablishing the destruction teeth through the complete metallic, metallic fused ceramic and totally ceramic crowns and substituting missing teeth with fixed partial denture by metallic, metallic fused ceramic and totally ceramic false (artificial)teeth (pontics) which place in edentulous area and retainers (crowns) which cement the implant or natural abutment teeth [29]. Fixed prosthodontics is essential for regaining tooth function and mastication, as well as for maintaining the integrity and health of the dental arch, preserving facial aesthetics, and supporting the temporomandibular joints (TMJs) [1].

Fixed Dental Restorations: (Fixed Partial Denture and Crown)

Fixed Partial Denture is an artificial prosthetic that replaces one or more missing teeth and cemented permanently to implants or remaining natural teeth, fixed partial denture has three parts such as pontic, retainer and connector [29]. This kind of prosthesis was in the past known as a dental bridge, although that name has since dropped out of use 1, 2 [29-30-31]. An abutment is a tooth or implant that serves as an anchor for a fixed partial denture. Pontic is the term for the prosthetic tooth which is suspended from abutment tooth to the edentulous are. That part of the fixed partial denture which contact the pontic with retainer is called connector, that part of fixed partial denture which cement the abutment tooth or implant is called retainer [29].

Crown

The extracoronary repair that covers the clinical crown's exterior is called a crown, and it is secured and cemented. When serving its purpose, it must resemble the morphology and figure of a tooth's fractured coronal sections. Additionally, it ought to shield the remaining tooth structure from further damage [29]. Periodontal issues were the main cause of crown failure, followed by dental cavities, uneven crown margins, inadequate cementation, loss of retention, and unsightly crowns [32]. While caries was the most common condition linked to FPD failure, other factors that came in second were periodontal issues, loss of retention, uneven margins, and cementation and cosmetic failure [32]. Systematic or routine patient recalls are necessary to evaluate crown and fixed dental prosthesis long-term success by assessing these restorations and supporting components. There are significant challenges with long-term follow-up in this part of the world as patient recall compliance is low [32]. So inadequate preparation of tooth margin lead to the failure of FPD and Crown [32].

Common Gum Issue (gingivitis)

The inflammation of gingiva is called gingivitis, this is a common gum issue that occurs a result of fixed prosthodontics therapy, gum inflammation might appear reddish, swollen, or even just bleed, but it does not result in a break in the connective tissue. [33]. The bacteria in the plaque release compounds that cause tissue irritation, which leads to gingivitis. Most people have clinical gingivitis symptoms 10–

20 days following plaque formation [33]. The key symptoms of gingivitis are redness, small swelling, and often the establishment of soft and hard coatings around the teeth. In this condition, teeth brushing can cause the gingival bleeding. Chronic gingival inflammation is characterized by the absence of gingival pain, but the duration of inflammation is long and weak. Hence, chronic gingival inflammation is often identified by a dentist. Chronic gingival inflammation is characterized by sometime bleeding during teeth brushing, bad breath, redness and swelling of the gum. the progresses gingivitis, the gums become brighter, swollen, and bleed. Layers accumulation on the teeth, occasionally causing destruction hard tissues of the teeth [34].

The restoration margin is positioned subgingivally in some fixed restoration evidence, which is the destruction of the gingival and periodontal tissues, It is believed that an overhang that violates the interproximal space results in:

- Localized irritation of the periodontal and gingiva tissues.
- Buildup and retention of plaque.
- A decrease in the patient's capacity to clean the subgingival and interproximal areas.
- Changes to the microbiota of the periodontal system [35].

Prevention of gingival inflammation

- Constant and regular cleaning of the mouth and teeth with toothpastes, gels and brush.
- When preparing natural teeth for fixed restorations, avoid the gum tissue destruction during the preparation.
- Fixed restorations margins should not be rough, over the gingiva and short from prepared tooth margin
- Best marginal integrity should be present.
- Use the retraction cord
- Stop smoking.
- Rinse mouth with solutions containing chlorhexidine, ethanol, thymol, and etc.
- Use toothpastes that contain triclosan.
- The above prophylactic actions are also used to treat gingivitis.
- Dental floss use is not recommended.

Complications of gingival inflammation

- Periodontitis and finally tooth loss.
- Invasion of infection to the periodontium tissues, facial spaces and jaw bones [34].

Conclusion

In conclusion, sustaining the health of the surrounding gingival and periodontal tissues depends on the appropriate placement and construction of fixed dental prosthesis. Main factors that can impact the success and longevity of fixed dental restorations include:

1. Ensuring proper oral hygiene applies by the patient, such as brushing, flossing, and regular dental cleanings, to prevent gingival inflammation and periodontal disease.
2. Careful attention to the margins, contours, and surface smoothness of the fixed dental restoration to minimize plaque accumulation and bacterial colonization.

3. To prevent encroaching on the biologic width and resulting in inflammation or attachment loss, the restoration's margins must be positioned no deeper than 0.5 mm into the gingival sulcus.
4. Maintaining the integrity of the periodontium by leaving at least 3 mm of sound tooth structure between the restoration edge and the alveolar bone.

By adhering to these principles, dental practitioners can minimize the risk of gingival and periodontal complications associated with fixed prosthodontic therapy and improve the long-term success of their restorative work. Careful case planning and execution, as well as patient education and compliance, are essential for achieving optimal outcomes.

References

1. Hind Majed E. Alotaibi et al (2021). The Relationship between Fixed Prosthodontics and Gingival Problems: A Systematic Review. *Saudi J Oral Dent Res*, 6(8): 372-377.
2. 2.Øzhayat, E. B., & Gotfredsen, K. (2019). Patient-reported effect of oral rehabilitation. *Journal of oral rehabilitation*, 46(4), 369-376
3. Heboyan A.G. Marginal and internal fit of fixed prosthetic constructions: A literature review. *Int. J. Dent. Res. Rev.* 2019;2:19
4. Pihlstrom B.L., Michalowicz B.S., Johnson N.W. Periodontal diseases. *Lancet*. 2005;366:1809–1820.
5. 5.Avetisyan, A.; Markaryan, M.; Rokaya, D.; Tovani-Palone, M.R.; Zafar, M.S.; Khurshid, Z.; Vardanyan, A.; Heboyan, A. Characteristics of Periodontal Tissues in Prosthetic Treatment with Fixed Dental Prostheses. *Molecules* 2021, 26, 1331. <https://doi.org/10.3390/molecules26051331>
6. Memari, Y.; Mohajerfar, M.; Armin, A.; Kamalian, F.; Rezayani, V.; Beyabanaki, E. Marginal adaptation of CAD/CAM all-ceramic crowns made by different impression methods: A literature review. *J. Prosthodont.* 2019, 28, e536–e544. [CrossRef] [PubMed]
7. Yin, J.; Liu, D.; Huang, Y.; Wu, L.; Tang, X. CAD/CAM techniques help in the rebuilding of ideal marginal gingiva contours of anterior maxillary teeth: A case report. *J. Am. Dent. Assoc.* 2017, 148, 834–839. [CrossRef]
8. Groten M, Axmann D, Pröbster L, Weber H. Determination of the minimum number of marginal gap measurements required for practical in vitro testing. *The Journal of prosthetic dentistry*. 2000;31;83(1):40–9.
9. Halawani SM. 2017;1(2):78–84. <https://doi.org/10.24911/IJMD.1.2.7>
10. Kosyfaki P, del Pilar Pinilla Martin M, Strub JR. Relationship between crowns and the periodontium: a literature update. *Quintessence Int* 2010;41(2):109–126.
11. Mishkin DJ, Gellin RG. Re: Biologic width and crown lengthening. *J Periodontol* 1993; 64: 920.
12. Al-Dabbagh RA. Quality of Fixed Dental Prostheses and Associated Biological Complications in a Saudi Population. *J Contemp Dent Pract.*, 2020;21(10):1130–1136.
13. Padbury A, Jr, Eber R, Wang HL. Interactions between the gingiva and the margin of restorations. *J Clin Periodontol.*, 2003;30(5):379–385. DOI: 10.1034/j.1600-051x.2003.01277.x.
14. Flores-de-Jacoby L, Zafiroopoulos GG, Ciancio S. Effect of crown margin location on plaque and periodontal health. *Int J Periodontics Restorative Dent.*, 1989;9(3):197–205.
15. Gargiulo AW, Wentz FM, Orban B. Dimensions and relations of the dentogingival junction in humans. *J Periodontol.*, 1961; 32: 261-267.
16. Block PL. Restorative margins and periodontal health: a new look at an old perspective. *J Prosthet Dent* 1987; 57: 683–689.
17. Kois JC. The restorative-periodontal interface: biological parameters. *Periodontol* 2000 1996; 11: 29 38.
18. Lang NP, Kiel RA, Anderhalden K. Clinical and microbiological effects of subgingival restorations with overhanging or clinically perfect margins. *J Clin Periodontol.*, 1983; 10: 563–578.
19. Donovan TE, Cho GC. Predictable aesthetics with metalceramic and all-ceramic crowns: the critical importance of soft-tissue management. *Periodontol* 2000 2001; 27: 121– 130. *Periodontology* 2000, Vol. 74, 2017, 40–62
20. Carnevale G, Sterrantino SF, Di Febo G. Soft and hard tissue wound healing following tooth preparation to the alveolar crest. *Int J Periodontics Restorative Dent* 1983; 3: 36– 53.
21. Nevins M, Skurow HM. The intracrevicular restorative margin, the biologic width, and the maintenance of the gingival margin. *Int J Periodontics Restorative Dent* 1984; 4: 30–49.
22. Pama-Benfenati S, Fugazzotto PA, Ferreira PM, Ruben MP, Kramer GM. The effect of restorative margins on the postsurgical development and nature of the periodontium. Part II. Anatomical considerations. *Int J Periodontics Restorative Dent* 1986; 6: 64–75.
23. Waerhaug J. Subgingival plaque and loss of attachment in periodontosis as observed in autopsy material. *J Periodontol* 1976; 47: 636–642.
24. Flores-de-Jacoby L, Zafiroopoulos GG, Ciancio S. Effect of crown margin location on plaque and periodontal health. *Int J Periodontics Restorative Dent* 1989; 9: 197–205.
25. Silness J. Fixed prosthodontics and periodontal health. *Dent Clin North Am* 1980; 24: 317 329.
26. Valderhaug J, Birkeland JM. Periodontal conditions in patients 5 years following insertion of fixed prostheses. Pocket depth and loss of attachment. *J Oral Rehabil* 1976;3: 237–243.
27. Stewart's Clinical Removable Partial Prosthodontics 4th Edition
28. Fundamental of Fixed Prosthodontics 4th Edition Herbert T. Shillingburg, Jr, DDS
29. The Glossary of Prosthodontic Terms. *J Prosthet Dent*, 2005;94: 10–92.
30. American Dental Association. Current Dental Terminology (CDT 2007– 2008). Eden Prairie, MN: Ingenix, 2006:47
31. Naveed SH, Pasha F, Kalsoom F, Qureshi K, Ihsan Z. Frequency of Factors Involved in crowns and Fixed Partial Denture Failure. *Med Forum* 2020;31(1):47-49. <http://dx.doi.org/10.17159/2519-0105/2018/v73no9a5>
32. Science and Innovation International Scientific Journal, Volume 1 ISSUE 7 UIF-2022: 8.2 | ISSN: 2181-3337
32. Millar, B., & Blake, K. (2019). The influence of overhanging restoration margins on interproximal alveolar bone levels in general dental practice. *British Dental Journal*, 227(3), 223-227. Article <https://www.nature.com/articles/s41415-019-0530-1>.