

ORIGINAL ARTICLE

EFFECT OF DENTAL PROXIMAL RESTORATIONS ON PERIODONTAL HEALTH IN PATIENTS

Bushra Irum¹, Muhammad Asif², Bakhtawar Mumtaz¹, Naveed Aslam³¹Department of Operative Dentistry, Khyber College of Dentistry Peshawar, ²Department of Operative Dentistry, Saidu College of Dentistry, Swat, ³DHQ, Hospital, Karak-Pakistan

Background: The oral cavity is colonized by more than 700 species of bacteria and hundreds of those can be present within oral biofilms. Objective was to determine the frequency of periodontal attachment loss in patients with dental proximal restorations. **Methods:** This cross-sectional study included 100 patients with Class II (mesial /distal or mesio-occluso-distal composite and amalgam restorations). The minimum duration of pre-existing restoration for which periodontal attachment loss was assessed was more than 3 months. Patients wearing orthodontic appliances, pregnant women, patients having systemic health problems with well-established links to periodontal diseases such as diabetes mellitus and patients who had received periodontal treatment within the last 3 months were excluded. Periodontal Pocket depth and bleeding on probing was recorded using WHO periodontal probe. Pocket depth greater than 3 mm was considered pathologic. The data were analyzed using the SPSS, version 20. Descriptive statistics were computed. Chi square test was applied to compare the effects of duration of restoration and type of teeth on periodontal attachment loss. **Results:** Of total 100 participants 65 (65%) were males and 35 (35%) were females. The mean age was 30.74±9.21 years. In 14% cases having class II or Mesio occluso distal restorations normal pocket depth was recorded while 86% had pathologic pockets. Teeth where proximal restorations were present for more than one year were most commonly associated (29%) with pathologic pockets followed by proximal restorations which were present for three months (25%). As the duration of proximal restoration increased, the frequency of periodontal pathologic pockets increased ($p<0.001$). The prevalence of periodontal pocket was more in molars than premolars ($p<0.001$). **Conclusion:** Proximal restoration can be a significant risk factor for periodontal disease. Strict oral hygiene, proper design of restoration margin and supportive periodontal therapy is the utmost responsibility of the clinician.

Keywords: Proximal restoration; Periodontal disease; Periodontal pocket; Amalgam; Class II cavity

Citation: Irum B, Asif M, Mumtaz B, Aslam N. The effect of dental proximal restorations on periodontal health in patients reporting. J Ayub Med Coll Abbottabad 2022;34(4 Suppl 1):987–90.

DOI: 10.55519/JAMC-04-S4-10454

INTRODUCTION

The oral cavity is colonized by more than 700 species of bacteria and hundreds of those can be present within oral biofilms.¹

Among these species some bacteria are highly linked to periodontal diseases namely Porphyromonasgingivalis, Treponemadenticola, and Tannerella forsythia. Known as the “Red Complex.” There is strong association with clinical parameters of severe periodontal disease, such as periodontal pocket depths and bleeding on probing.² The maintenances of the biological health of tooth supporting tissue is essential as severe consequences of violation of the biologic width have been reported due to the interaction between microbial action and host immune system, for instance the influence of toxins released from bacteria on the alveolar crest.³ Restorations placed subgingivally can have deleterious consequences on the adjacent hard and soft tissues, particularly if the restoration is impinging on the

junctional epithelium and supra-crestal connective tissue.⁴

In literature it is well documented that restorations with over-hang margins lead to changes in oral environmental.⁵ When the balance between the useful and pathogenic bacteria is lost in the oral cavity, exacerbation of plaque formation may occur.⁶ Periodontal disease is one of the important consequences of interproximal restorations violating the biologic width. The other causes of periodontal disease are fixed partial denture, artificial crowns and the least probable aetiology being removable prosthesis.⁷ The periodontal disease prevalence has a direct relationship with type of restorations and its site of placement. A relationship has also been found between periodontal disease and materials used for different sort of restorations.⁸ Over-hanged margins of amalgam filling can have myriad of harmful influences on the oral health. In most of the cases the surfaces of the proximal restorations that have over-hanging margins that lead to increased plaque accumulation may be expected to have

more frequent secondary caries than proximal restored surfaces with no overhangs.⁹The increased plaque retention of such restoration potentially results in high rate of destruction of the periodontal tissues.¹⁰

Halperin-Sternfeld *et al*¹¹ reported a significant association between the presence of proximal restorations and the prevalence of periodontal loss. The strength of association was higher for inadequately restored teeth and become less significant over time in patients undergoing routine supportive periodontal care. Gasgoos *et al*¹² reported that that amalgam restoration induces the higher means of plaque retention leading to gingivitis and pocket depth formation.

Over the past few decades, many studies have been carried out on the effects of the restoration margin placement, location, surface integrity of restoration, and type of restorative material on periodontal tissue health.^{13,14}There is little doubt that poorly contoured restorations can increase plaque retention and/or violate the biologic width.¹⁵ However, there is scarcity of local studies on this topic, also to our knowledge no study is available on difference in the prevalence of periodontal pocket in relation to proximal restoration between molars and premolars so the aim of this study was to determine frequency of periodontal attachment loss in patients with dental proximal restorations in our set up. The results of the study will emphasize the importance of placing proximal restorations with proper contours to avoid periodontal attachment loss.

MATERIAL AND METHODS

This cross-sectional study was conducted from April to September 2018 after taking ethical committee approval from Rehmat Memorial dental teaching hospital. One hundred patients attending Rehmat Memorial Dental Teaching Hospital, Abbottabad were selected from OPD on the basis of clinical experience arbitrary method and non-probability consecutive sampling technique. The purpose and details of the study were explained and informed consent was obtained from all participants.

Inclusion criteria included Class II and mesio-occluso-distal (MOD) amalgam and composite restoration. The minimum duration of restorations present in oral cavity was more than 3 months. All the restored teeth were in occlusion with the natural dentition and had proximal contact with adjacent teeth. Exclusion criteria included patients wearing orthodontic appliances, pregnant women, patients having systemic diseases with well-established links to periodontal diseases such as diabetes mellitus and patients who had received periodontal treatment within last 3 months.

Detailed history was taken and clinical examination done for each patient. Conventional periapical radiographs for teeth with proximal restorations were taken to record margin of the

restorations. Periodontal pocket depth and bleeding on probing was recorded using WHO periodontal probe. Pocket depth greater than 3 mm was considered pathologic.

The data were analyzed using the statistical package for social sciences (SPSS, version 20). Frequency and percentages were computed for categorical variables like gender, type of restoration (class II or MOD), pathologic periodontal pocket presence or absence, duration of restoration, tooth type, and bleeding on probing. Mean and standard deviation were calculated for age. Chi square test was applied to compare periodontal health (periodontal Pocket) among duration of restoration and type of teeth. $p \leq 0.05$ was considered significant.

RESULTS

Of total 100 participants, 65 (65%) were males and 35 (35%) were females. The mean age was 30.74 ± 9.21 years with range of 18–46 years. Among the age groups; the most common was 21–25 years and 31–35 years (21%) followed by 41–40 years (16%). Fifteen participants were in age group 15–20 years, 14 were in 26–30 years, 7 cases were in 36–40 years and 6 were in 46–50 years.

In 43% (n=43) restoration margins exhibited bleeding on probing. Out of total included cases (n= 86, 86%) had class 2 restorations which were more than mesio-occluso-distal restorations (n=14, 14%). The restorations were assessed and classified on basis of GV Black classification.¹⁶

Out of 100 cases having class II or MOD restoration 14% had normal periodontal pocket depth (less than 3mm) while 86% had pathologic periodontal pocket (greater 3 mm). In all MOD cases (n=14, 14%) the periodontal pockets were on both sides. Mesial and distal pockets were found equally (n=36, 36%) (Table-1) Most common duration of restoration was ‘more than one year’ (29%) followed by ‘three months’ (25%). Pathologic pockets were recorded in both the upper and lower proximally restored molars. The pathologic pocket was recorded in 15 (68.2%) in upper premolars and in 7 (50%) in lower premolars. These differences were statistically significant ($p < 0.000$). As the duration of restoration increased, the frequency of periodontal pathologic pockets was more. The highest frequency was for more one-year duration (100%). These results were statistically significant ($p < 0.000$). (Table-2)

Table-1: Location of periodontal pocket

Location of pocket	Frequency	Percent
Normal (nil)	14	14
Mesial	36	36
Distal	36	36
Both side	14	14
Total	100	100

Table-2: Frequency of periodontal pocket stratified by tooth type and duration of restoration

		Periodontal Pocket				p-value*
		Present*		Normal		
		n	%	N	%	
Tooth	Upper premolars	15	17.4	7	50.0	<0.001
	Upper molars	36	41.9	0	0.0	
	Lower Premolars	7	8.1	7	50.0	
	Lower Molars	28	32.6	0	0.0	
Duration of restoration	3 months	14	16.3	11	78.6	<0.001
	6 months	21	24.4	2	14.3	
	1 year	22	25.6	1	7.1	
	More than 1 year	29	33.7	0	0.0	

*More than 3mm pocket depth. **chi-square test

DISCUSSION

The current study found a higher frequency of periodontal pockets adjacent to proximal restorations. It was also observed in this study that more periodontal attachment loss can be expected in teeth restored with composite or amalgam especially in the proximal area. Similar results were found by Halperin-Sternfeldet and Gasgoos.^{11, 12}

In this study males were more than females. This may be due to the lesser oral hygiene practices in males which lead to more carious lesions and consequently more class II and MOD restorations. The other reasons for more males in our sample may be the low literacy rate in females as compared to males so lesser visits or reporting to dental offices. Another cause may be the choice for opting extraction instead of restoration of carious lesions. A study conducted on Israeli population on “the association between dental proximal restorations and periodontal disease” had more females than males.¹¹This difference from our findings may be due to difference in education level of our country and Israel.

Our results showed that approximately half of cases restored with proximal filling had gingival bleeding on probing (gingivitis). Most of the proximal restorations have overhanging margins which retain plaque and hence result in gingivitis. Similar results were reported by Halperin-Sternfeldet.¹¹

A study carried out on Iraqi population showed significantly increases gingival index score on proximally restored than controlled side.¹² However, in our study we did not apply gingival index and only checked bleeding on probing. Bleeding on probing and gingival index equally show gingival health.¹⁷

Most of cases had (86%) pathologic periodontal pocket (more than 3 mm). All the molars with proximal restoration included in the study had pathologic periodontal pockets. The more frequent periodontal disease in molars than premolars may be due to difference in anatomy and more posterior location

which may cause difficulty in finishing the restoration margins. It may also be due to the fact that patients cannot maintain proper oral hygiene in posterior teeth as compared to anterior teeth.

Association of the duration of the restoration with development of the pathologic periodontal pocket was statistically significant ($p < 0.05$). The more the duration of the restoration, the higher is the frequency of development of pathologic periodontal pocket. This may be due to slower progression of periodontal disease and initially the efficacy of the host immune response.¹⁶

The results of the study will emphasize the importance of placing proximal restorations with proper contours to avoid periodontal attachment loss. The limitation of this retrospective study could not provide sufficient evidence to imply a causal relationship between the presence of dental proximal restorations and periodontal disease progression.

CONCLUSION

Proximal restoration could be a significant risk factor for development of periodontal disease. Strict oral hygiene, proper proximal contour development of restoration and supportive periodontal therapy is the utmost responsibility of the clinician.

AUTHORS' CONTRIBUTION

BI: Write-up, proof reading, literature search. MA: Data collection, data analysis. BM: Conceptualization of study design.

REFERENCES

- Gao L, Kang M, Zhang MJ, Sailani MR, Kuraji R, Martinez A, *et al* Polymicrobial periodontal disease triggers a wide radius of effect and unique virome. NPJ Biofilms Microbiomes 2020;6(1):10.
- Lamont RJ, Jenkinson HF. Life below the gum line: pathogenic mechanisms of Porphyromonas gingivalis. Microbiol Mol Biol Rev 1998;62(4):1244–63.
- Almeida A, Esper L, Sbrana M, Cunha M, Greggi S, Carrilho G, *et al*. Relationship between periodontics and restorative procedures: surgical treatment of the restorative alveolar interface (rai)—case series. J Indian Prosthodont Soc 2013;13(4):607–11.
- Novaes AB Jr, Novaes AB, De Oliveira PT. Preprosthetic periodontal surgery in the interproximal area with

- modification of the COL area: Anatomic and histologic study in dogs. *J Periodontol* 2001;72(12):1734–41.
5. Genco RJ, Borgnakke WS. Risk factors for periodontal disease. *Periodontol* 2013;62(1):59–94.
 6. Quadir F, Abidi SYA, Ahmed S. Overhanging amalgam restorations by undergraduate students. *J Coll Physicians Surg Pak* 2014;24(7):485–8.
 7. Tavangar M, Darabi F, Tayefeh DR, Vadiati SB, Jahandideh Y, Kazemnejad LE, *et al.* The prevalence of restoration overhang in patients referred to the dental clinic of Guilan University of Medical Sciences. *J Dentomaxillofac Radiol Pathol Surg* 2016;5(1):18–23.
 8. Rajan K, Ramamurthy J. Effect of restorations on periodontal health. *J Dent Med Sci* 2014;13(7):2279–861.
 9. Yasar F, Yesilova E, Akgünlü F. Alveolar bone changes under overhanging restorations. *Clin Oral Invest* 2010;14(5):543–9.
 10. Hickel R, Roulet JF, Bayne S, Heintze SD, Mjör IA, Peters M, *et al.* Recommendations for conducting controlled clinical studies of dental restorative materials. *Clin Oral Invest* 2007;11(1):5–33.
 11. Halperin-Sternfeld M, Saminsky M, Machtei EE, Horwitz J. The association between dental proximal restorations and periodontal disease: A retrospective 10-18 years longitudinal study. *Quintessence Int* 2016;47(3):249–59.
 12. Gasgoos SS, AL-Sanjary SA. Effect of Class II Amalgam and Composite Restorations on Periodontal Health of Posterior Teeth: An in vivo study. *J Oral Dent Res* 2017;4(2):82–92.
 13. Juloski J, Köken S, Ferrari M. Cervical margin relocation in indirect adhesive restorations: A literature review. *J Prosthodontol Res* 2018;62(3):273–80.
 14. Broadbent JM, Williams KB, Thomson WM, Williams SM. Dental restorations: a risk factor for periodontal attachment loss? *J Clin Periodontol* 2006;33(11):803–10.
 15. Paolantonio M, D'ercole S, Perinetti G, Tripodi D, Catamo G, Serra E, *et al.* Clinical and microbiological effects of different restorative materials on the periodontal tissues adjacent to subgingival class V restorations: 1-year results. *J Clin Periodontol* 2004;31(3):200–7.
 16. Black GV. *A work on operative dentistry*. Chicago: Medico-Dental, 1980.
 17. Newman MG, Takei H, Klokkevold PR, Carranza FA. *Carranza's clinical periodontology: Elsevier health sciences: 2011;p.33–9.*

Submitted: December 11, 2021

Revised: February 16, 2022

Accepted: March 27, 2022

Address for Correspondence:

Dr. Bushra Iram, Assistant Professor, Department of Operative Dentistry, Khyber College of Dentistry Peshawar-Pakistan

Cell: +92 333 521 3387

Email: bushrairum50@gmail.com