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ISSN 1462 2815

PREVALENCE OF PERIODONTAL PROBLEMS ASSOCIATED WITH CLASS II RESTORATIONS

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DOI: 10.5281/zenodo.11059024

Abstract

The study aimed to assess the prevalence of periodontal issues associated with class II dental restorations. 174 patients with periodontal problems and a history of class II LCR restorations were included. Data analysis using SPSS revealed a statistically significant correlation ($p<0.05$) between periodontal problems and class II restorations. The majority of male patients (55.17%) exhibited periodontal issues compared to females (44.83%). The findings suggest that interproximal caries and dental restorations pose local risk factors for localized periodontal attachment loss. Dentists should prioritize minimizing these risk factors and carefully monitor and treat interproximal sites with or requiring adjacent restorations. Poorly contoured restorations may exacerbate plaque retention and compromise the biologic width. Understanding these associations is vital for effective preventive and therapeutic strategies in managing periodontal health in patients with class II restorations.

Keywords: Proximal Caries; Periodontal Problems; Class II

INTRODUCTION

Gingival recessions and noncarious cervical lesions (NCCLs) and proximal caries are frequently associated with the same tooth surface, forming a combined defect, and are closely related. These combined defects result innumerous aesthetic and functional problems, and a comprehensive treatment approach is required to address the issue. A combined restorative-periodontal therapy, in which the restorative therapy is completed before mucogingival surgery, has been proposed for the treatment of gingival recession that is associated with NCCLs. Following the healing period after surgery, the soft tissue is positioned over a part of the restorative material and the apical border of the restoration is in the subgingival area. However, the response of the gingival tissues to the restorative materials is very important, and this relationship has been thoroughly investigated over many years. Over the past 40 years, numerous studies have considered the effects of the location of restoration margin placement, restoration surface integrity, and type of restorative material on post-intervention periodontal tissue status. There is little doubt that poorly contoured restorations can increase plaque retention and/or violate the biologic width. However, there is controversy about whether the placement of a new restoration pre-disposes the adjacent periodontal tissues to future breakdown.

It has been reported that subgingival restorations are associated with greater plaque accumulation, bleeding on probing, and attachment loss, while other studies have indicated that the restorations do not result in greater biofilm formation, bacterial accumulation and clinical attachment loss, compared with non-restored areas (Raj PS, Martin TM and Kumar MS et al. 2024). Bacterial composition on subgingival restorations can trigger the development of periodontal disease. It has been suggested

that some members of this composition, known as “keystone pathogens”, could regulate biofilm virulence and modulate the host immune response. Longitudinal studies have shown that periodontal disease progression can be predicted by the levels of *Porphyromonas gingivalis* (Pg) and *Treponema denticola* (Td) in subgingival plaque. Moreover, it has been reported that Pg and *Prevotella intermedia* (Pi) are more frequently associated with deeper periodontal pockets. Various dental materials and surgical approaches have been used to manage these combined defects, in order to provide the most predictable combined restorative-periodontal treatment (Khalid JP et al. 2024). Some of the previous studies evaluated the effects of subgingivally placed restorative materials on periodontopathogenic bacteria in the combined restorative-periodontal treatment. However, there is a lack of information in the current literature regarding the effect of subgingival restorations that are carried out using nanofilled composite resin (NCR), Resin-modified Glass ionomer (RMGI) and giomer on periodontopathogenic bacteria in the treatment of gingival recessions associated with NCCLs. Therefore, the aim of this study is to determine the prevalence of periodontal problems associated with class II dental restorations.

MATERIAL AND METHODS

This retrospective study was conducted under a hospital-based university setting. Ethical approval for this study was granted by the institute’s ethical committee (ethical approval number: SDC/ SIHEC/ 2020/ DIASDATA/ 0619-0320). Consent to use treatment records for research purposes were obtained from patients at the time of patient entry into the university for dental needs. The retrospective data were collected by obtaining and analyzing the 66100 dental case records of the university from June 2019 to March 2021.The sample size that was taken are 174 patients with a history of class II restoration associated with periodontal problems, who came to the private dental institute for consultation and treatment. The inclusion criteria for the current study were patients with a history of class II restorations including distal proximal restoration, mesial proximal restoration and mesiodistal proclination restoration, complete photographic and written records regarding the complete intra-oral examination of the patient. The exclusion criteria were incomplete data, censored dental records and absence of photographic evidence (USHANTHIKA T et al. 2020). The case sheets were reviewed for clinical photographs, past dental history, treatment done, and periodontal status and the data was recorded. The selected cases were examined by three people; one reviewer, one guide and one researcher. The patients’ case sheets were reviewed thoroughly. Cross checking of data including digital entry and intra oral photographs was done by an additional reviewer and as a measure to minimize sampling bias. Digital entry of clinical examinations and intra oral photographs of selected subjects were assessed and this included the assessment of class II restoration and periodontal status as mentioned before by the examiner based on intraoral photographs and clinical examination data for each tooth.

The examiner was trained to add data of class II restored tooth with periodontal problems present or absent for all the cases by tabulation using Microsoft Excel software. The mentioned data were coded and transferred into SPSS PC version 2.0 (IBM 2019) software for statistical analysis. A correlation and association test, Chi-Square Test was done. The results were recorded. The difference was considered statistically significant as the p value was less than 0.05. ($p<0.05$)

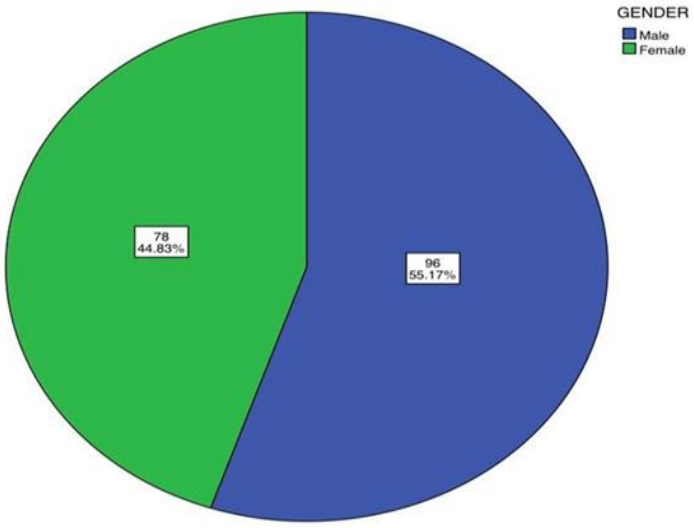

Figure 1: shows the total number of patients undergone class II LCR restoration and associated with periodontal problems in the same tooth/teeth based on their gender

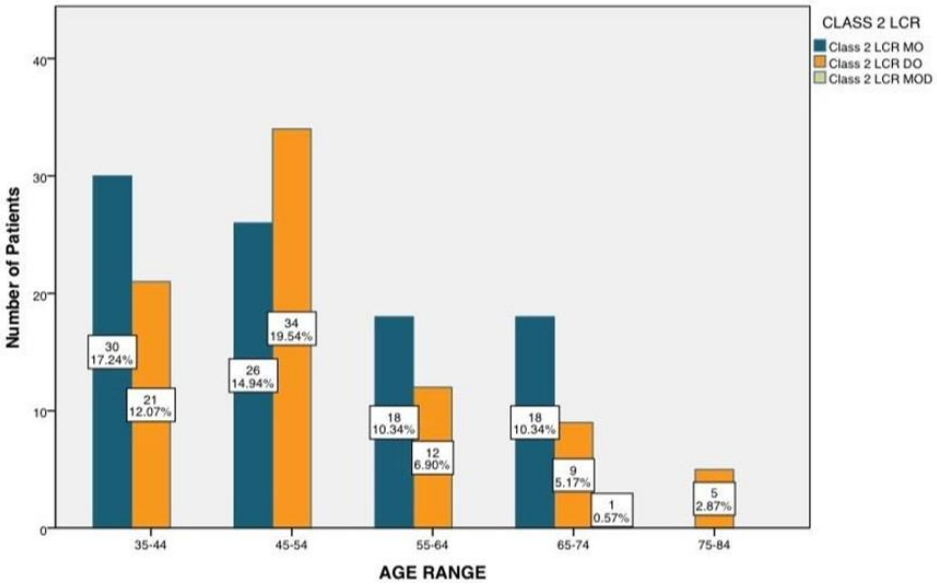

Figure 2: shows the percentage of patient who have periodontal problems (associated with class II LCR restoration) based on their age range

ISSN 1462 2815

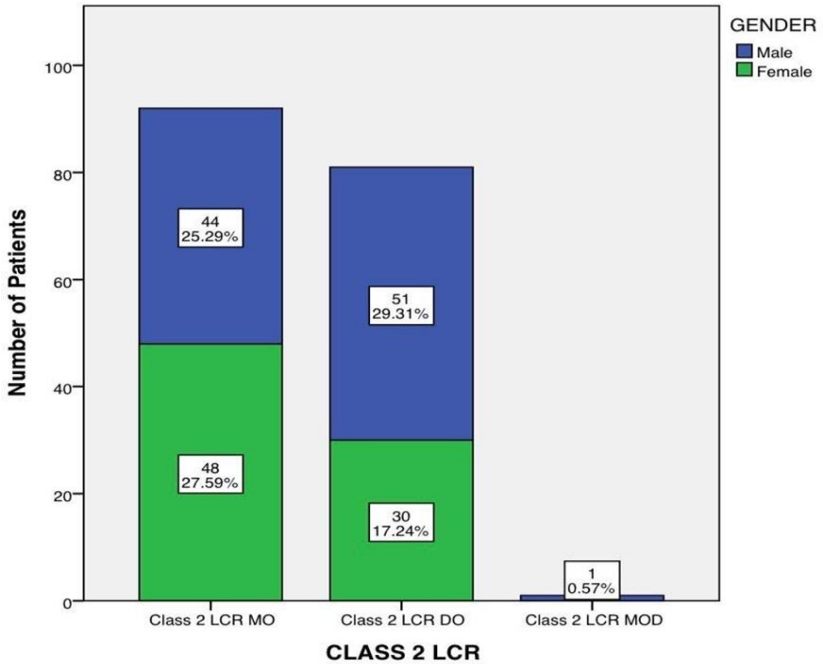

Figure 3: shows a stacked bar graph which explains the relation between gender of patient and the type of class II LCR restoration

According to Figure 1, the majority of male (55.17%) patients have periodontal problems on their tooth which was treated with LCR class II restorations before. Whereas, female (44.83%) patients were involved in this study. Figure 2 shows that patients with periodontal problems were in huge amounts with the age range of 45-54 years old (34.48%). In the same case, the majority of the patients have undergone disto-occlusal LCR restoration (19.54%). About 14.94 of the patients with the same age range underwent mesio- occlusal LCR restoration. Only 0.57% (least) of the patients were seen to undergo mesio-occlusal distal LCR restoration with the age range of 65-74. In the age range of 35-44 years old, the greatest number of cases were seen is mesio-occlusal restorations (17.24%) and disto-occlusal restoration were 12.08%. Figure 3 explained the type of class II LCR restorations associated with gender. It showed that the greatest number of male (29.31%) patients have undergone class II (DO) LCR restorations. Whereas, most female (27.59%) patients have undergone class II (MO) LCR restorations. This correlation was statistically significant as the p value was less than 0.05 (p=0.037)

DISCUSSION

One 5-year study of 114 adults reported a mean increase in periodontal pocket depth of 1.2 mm following the placement of crowns with subgingival margins (even when professionally administered prophylaxis was provided every 6 months); where the crowns were placed with supragingival margins, a mean increase of only 0.6 mm was reported by the end of the study period (Valderhaug & Birkeland 1976). Another study compared periodontal measurements from abutment teeth and non-abutment teeth in 55 individuals 15 years following the placement of fixed restorations: gingival index scores and pocket depths were slightly greater for abutment teeth; However, a majority of sites (57%) had pocket depths at 2 mm, and those sites that lost attachment did so within the first 5 years following restoration placement (Valderhaug et al. 1993).

Two separate longitudinal studies performed on adolescents and adult males in Norway confirmed the relationship between caries and restorations and future periodontal disease breakdown. A Scandinavian study followed a randomly selected group of Norwegian males for 26 years, and obtained periodontal data for 160 individuals at seven intervals during the study period. Data collected included measures of the gingival index, plaque index, gingival caries index, gingival restoration index, and gingival recession and loss of attachment [clinical attachment level (CAL) at each observation period. “Test” and “Control” sites were defined based on the presence or absence of restorations at baseline and throughout the study period (Chockalingam S et al. 2020).

The plaque index scores increased with each group over time, with no difference between the test and control sites. In contrast, gingival index and gingival caries index scores were greater for the test sites at several observation periods. With respect to the “gold standard” for periodontal destruction – clinical attachment loss – there were only small differences between the test and control sites across time.

The greatest CAL occurred between 2 and 4 years in the test site group; however, the pattern of CAL over time was similar to test and control sites, with differences being relatively equivalent over 26 years, suggesting that the presence of restorations was not associated with periodontal attachment loss (Schatzle et al. 2001). Another longitudinal study of periodontal disease examined the association between caries and restorations, and periodontal disease in a sample of 227 13-year-old adolescents over a 3-year- period. These authors reported significantly greater odds for having gingival inflammation and radiographic bone loss at sites proximally to teeth with manifest caries, defective fillings, and non-defective fillings.

While these results were statistically significant, the odds ratios (ORs) and 95% confidence intervals (CIs) subsequently computed by us from the b estimates and SEs were very small (Prathap L et al. 2022). CAL was determined by measuring the distance to the alveolar crest to the nearest 0.1 mm using bitewing radiographs taken at yearly intervals. The impact of other confounding variables was not considered in their analyses. None of the longitudinal studies reported to date have controlled for the potential effects of other covariates known to be associated with periodontal inflammation while concomitantly allowing for the clustering of sites within individuals (Albandar et al. 1995).

By contrast, a 1-year longitudinal study found that neither periodontal clinical parameters nor site-specific microbiology changed 12 months after the placement of amalgam or glass ionomer restorations. There was, however, a statistically significant increase in total bacterial counts obtained from subgingival sites adjacent to composite resin restorations at 8- and 12-month follow-up assessments.

The authors concluded that composites may create a greater hazard to periodontal health than other restorative materials. It is not possible to generalize from these findings, however, as they were obtained from a sample of only 16 healthy individuals for whom oral hygiene was continually reinforced throughout the short 1-year study period (Paolantonio et al. 2004).

CONCLUSION

In general, dentists should consider inter-proximal caries and dental restorations to be local risk factors for localized periodontal attachment loss. Accordingly, they should take appropriate steps to minimize the occurrence of either, and to monitor carefully the inter-proximal sites that have adjacent restorations. Poorly contoured restorations can increase plaque retention and/or violate the biologic width; however, there is controversy about whether inter-proximal restorations predispose the adjacent periodontal tissues to further breakdown. In future, a study with a large scale has to be done to determine the accurate hypothesis.

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