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Clinical periodontal response in posterior metal-ceramic crowns with either deep chamfer or shoulder tooth preparation: An invivo study

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Abstract

Aim of the study: The aim of this study was to determine clinical periodontal response in posterior metal-ceramic crowns with either shoulder or deep chamfer tooth preparation and patient perception.

Material and Methods: 50 patients were included in the study after verifying the inclusion and exclusion criteria. The missing teeth planned for fixed partial restoration were randomly assigned to one of the two different treatment groups. Patients were assigned into two different groups Group 1- shoulder finish line and Group 2- deep chamfer finish line. After recruitment, oral prophylaxis was performed and Oral hygiene instructions were given to the patients and was asked to use mouthwash 0.2% chlorhexidine gluconate. After one week, periodontal probing depth, plaque index, gingival index, bleeding on probing and gingival recession were assessed. Six months postcementation of the restorations. The same clinical periodontal parameters were registered before the initiation of the treatment was taken. Each patient answered the questionnaire to assess their level of satisfaction regarding comfort and functional aspects of the restoration. The data were analyzed for both groups. The descriptive statistics included mean and standard deviation for both groups

Results: The results showed that there was statistically significant increase in gingival index, periodontal probing depth, bleeding on probing ,plaque index and gingival recession when compared to baseline and six months post cementation in shoulder and deep chamfer finish lines.

Conclusions : within the limitations of study increased periodontal probing depth, bleeding on probing was seen in shoulder finish line. There was an increase trend of gingival recession in deep chamfer finish line.

Keywords: equigingival margin placement, shoulder, deep chamfer finish line, periodontal health.

Introduction

The restoration of partially edentulous ridges is usually treated with fixed partial denture in cases where implant is relatively contraindicated. It serves as an excellent purpose for replacement of missing teeth..The success rate of metal –ceramic posterior restoration was 85% and survival rate was 97 .6% whereas for zirconia crowns the success and survival rate was 74 . 3% and 94% respectively (1,2) The relationship between restoration of teeth and periodontal health is intimate. They are inseperable and for a restoration to withstand for a longer duration of time, periodontium must be healthy so that teeth remains well maintained. One of the primary prerequisite for successful prosthodontics and restorative procedures is to maintain proper periodontal health. Extent and location of finish line influences the health of periodontium. (2) Marginal integrity is one the most important factor of an indirect restoration which determines success or failure of a porcelain fused to metal (PFM) restoration. (3) .If the margins are not managed properly, it leads to increase in microbial plaque accumulation, gingival inflammation, changes in the subgingival flora and color changes in the marginal gingiva and in severe cases it leads to an increase in pocket depth and loss of attached gingiva. (4,5) . This has shown to develop recurrent marginal caries and effect on periodontal health. (Mitchell et al,2001; Suarez et al, 2003). (6,7) The amount of marginal opening may depend on cement dissolution, wear, and gingival inflammation and does not directly correlate with recurrent caries, progression of periodontal disease and microleakage. (8,9 ,1 0) There are many finish lines such as knife edge, deep chamfer, shoulder, shoulder- bevel but shoulder, deep chamfer and shoulder - bevel are most commonly used as finished lines for metal ceramic restoration. (4 ,)

The aim of this study was to determine clinical periodontal response in posterior metal-ceramic crowns with either shoulder or deep chamfer tooth preparation.

Objectives

- Objective was to evaluate the influence of a deep chamfer finish line on the periodontal soft tissue parameters when compared with shoulder finish line.

Study protocol

50 patients (22 males,28 females, aged >40years) were included in the study after verifying the inclusion and exclusion criteria. Patients included for the study were explained regarding the study protocol and patients signed the informed consent form. Research protocol was approved by the Ethics Comittee of the university. The missing teeth planned for fixed partial restoration were randomly assigned to one of the two different treatment groups. The teeth allocation was concealed by means of sealed envelopes until the moment of preparation. Patients were assigned into two different groups Group 1- shoulder finish line Group 2- deep chamfer finish line. Flat end tapered and round end bur were used for group 1 and 2 respectively. After recruitment, oral prophylaxis was performed and Oral hygiene instructions were given to the patients and was asked to use mouthwash 0.2% chlorhexidine gluconate. It was done to establish optimal plaque control and gingival health.

One week later, the following periodontal measurements were registered by experienced periodontists such as a) Periodontal probing depth (PPD) at three different facial sites mesial, midpoint, distal with UNC periodontal probe and then rounding the measurements to the nearest millimetre b) Plaque index (PI) according to Silness and Loe rounded at the highest score Disclosing agent was applied on the teeth before s coring. Patient was asked to swish for 30 seconds and then expectorate but not rinse and then examined. c) Gingival index (GI) according to Loe and Silness rounded at the highest score To obtain GI, the tissues surrounding each tooth are divided into four gingival scoring units.- distal-facial papilla, mesial-facial papiila and entire lingual gingival margin. A blunt instrument such as periodontal probe was used to assess the bleeding potential of tissues. d) Gingival Bleeding on probing (BOP) according to Ainamo and Bay

Under local anesthesia (articaine with 1:100,000 epinephrine) all restorative procedures by one experienced prosthodontists. Then after sometime preparation for all posterior teeth receiving metal-ceramic fixed partial restoration was employed placing equigingival margin placement i.e placed on the gingival margin. Flat-end tapered diamond bur was used for shoulder finish line and round end diamond burs was used for deep chamfer finish lines using a 40000 -rpm speed and a 4.5 magnification.

All provisional restoration were fabricated with heatpolymerizing polymethylmethacrylate (PMMA) acrylic resin [DPA, Mumbai] and then relined with autopolymerizing PMMA acrylic resin [DPA, Mumbai] in order to minimize the adverse effects of free monomer excess and heat transfer to the tooth and surrounding tissues. Patients were asked to use 0.2% chlorhexidine gluconate solution for 10 days and then recalled for impression procedures.

The metal-ceramic restorations fabricated for all teeth were cemented with type1 GIC luting cement (3M Espe Ketac Cem Glass Ionomer Cement). All excess cement was carefully removed and occlusion was verified. Oral hygiene instructions were given to the patient including the use of dental floss.

Results

The results of the tests were analyzed with statistical tests like 1. Mann-Whitney test 2. Chi-Square test.

Plaque Index (PI)

There was a statistical difference between baseline and 6 months follow up for plaque index in both shoulder and chamfer finish lines but there was no statistical significant difference between the two types of shoulder and chamfer lines. (p=0.687)

Gingival Index (GI)

There was a statistical difference between base and 6 months follow up for Gingival index in both shoulder and chamfer finish lines but there was no statistical significant difference between the two types of shoulder and chamfer finish lines. (p=0.160)

Periodontal Probing Depth (PPD)

There was a statistical difference between base and 6 months follow up for periodontal probing depth in shoulder and chamfer finish lines. Mann-whitney test revealed that there was statistical significant difference between the shoulder and chamfer finish lines. (p=0.004) it revealed that periodontal probing depth after 6 months was more in shoulder finish line than chamfer finish line.

Bleeding on Probing (BOP)

There was a statistical difference between base and 6 months follow up for bleeding on probing in both shoulder and chamfer finish lines. Chi-Square test revealed that there was statistical significant difference between the shoulder and chamfer finish lines. (p=0.039) It revealed

that bleeding on probing after 6 months was more in shoulder finish line compared to chamfer finish line.

Gingival Recession

There was a statistical difference between base and 6 months follow up for gingival recession in shoulder and chamfer finish lines. Mann –whitney test revealed that there was statistical significant difference between shoulder and chamfer finish lines.

(p=0.00) It revealed that chamfer finish line had more of gingival recession than shoulder finish line.

Discussion

Supragingival margin placement is facilitated during tooth preparation and most accessible to clean. The success of periodontal-prosthetic interrelationship is based on biological consideration such as margin placement and biological width, margin fit, crown contour .Esthetic considerations such as interproximal embrasure form, the gingival embrasure, pontic design and occlusal consideration has influence on periodontal-prosthetic interrelationship.

Among various margin designs, usually horizontal preparation such as shoulder, chamfer is preferred over vertical preparation such as featheredge.

Various studies have shown that subgingival placement of restorative margins will lead to iatrogenic marginal inflammation that will further lead to periodontitis along with attachment loss.

Marcum JS in his study observed a favourable periodontal response if the margins were located at the gingival crest when compared to sub - gingival placement. Valderhaug in his study with 10years of follow up did a study on the effects of different placement of crown margin on gingival health , loss of periodontal attachment and incidence of caries and concluded that crown margins placed supragingivally had least amount of attachment loss followed by margins placed at gingival crest and then subgingival crown margins. Reitemeier observed at intrasulcular posterior crown margins, the risk of bleeding was approximately twice than that at supragingival margins.

At the 6 months follow up, plaque index and gingival index were increased with no statistical difference between two types finish lines. Periodontal probing depth, bleeding on probing increased in shoulder compared with chamfer restorative margins whereas gingival recession was increased more in chamfer finish lines.

Conclusion

Within the limitations of study, comparing the periodontal response parameters of two finish lines- shoulder and deep chamfer placed equigingivally, pre and post cementation 6 months in posterior metal fused porcelain crowns , the following conclusions were derived

1. Periodontal probing depth, bleeding on probing and gingival recession, plaque index had statistical difference between baseline and after six months follow up
2. plaque index, gingival index did not have significant difference between shoulder and chamfer finish line.
3. Periodontal probing depth, bleeding on probing increased in shoulder compared with deep chamfer finish lines.
4. Deep chamfer finish line showed increased gingival recession after 6 months.

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References

1. Marcum J S. The effect of crown margin depth up on gingival tissue. J Prosthet Dent.1967 ; 17 : 47 9-487

2. Bjorn AL , B jorn H , Blagoje G . Marginal fitofrest oration and it relation to periodontal bone level . Odon to l Revy 1969 : 20 : 311 -321
3. Renggli HH , Regolati B . Gingival in Flammarion and plaque accumulation by well adopted supragingival and subgingival proximal restoration s . Helv Odon to l Act a 1972 ; 16 : 99 - 1 01.
4. Shilling burg HT Jr , Hobo S , Fischer D W . Preparation design and margin distortion in porcelain fused - to metal restorations . J Prosthet Dent 1973 ; 29 :276 - 284
5. Amsterdam M, Periodontal prosthesis. Twenty -five years in retrospect Alpha Omega an 1974 ; 67 : 8 - 52
6. Kuwata M . Gingival margin design abutments force ram mental restorations. 2. quintessence Dent Technol 1979 ; 10 : 27 - 38
7. J Gary Maynard, J R, Richard Daniel. Physiological dimensions of the Periodontium signicant to the rest operative dentist. Journal o f Periodontology, 50 (4) , 170 - 174 , 1979
8. Valderhaug J. Periodontal conditions and carious lesions following the insertion of fixed prosthesis a 10 -year follow – up study. Int Dent J. 1980 ; 30 : 296 - 304
9. Pardo GI. A full cast restoration design offering superior marginal characteristics . J Prosthet Dent 1982 ; 48 : 539 - 543
10. Neivns M , Skurow HM. The in trace vascular restorative margin , the biological width and maintenance of gingival margin. Int J Periodontics Restorative Dent 1984 : 4 (3) : 31 – 49.

Legend Figures and Tables

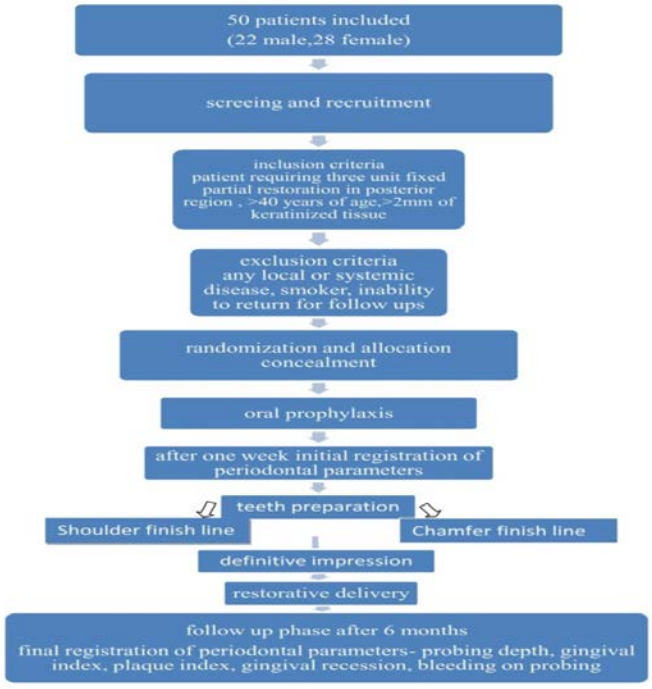

Fig:1 Methodology flow chart

Fig 2: Deep chamfer finish line

Fig 3: Shoulder finish line

Table 1:Grpoup Shoulder Finish Line

	N	Minimum	Maximum	Mean	Std. Deviation
PRE Gingival index	25	1	1	1.00	.000
PREP robing depth	25	1	1	1.00	.000
PREBOP	25	0	0	.00	.000
PRE Gingival Recession	25	1	1	1.00	.000
PRE Plaque	25	0	0	.00	.000
POST Gingival index	25	1	2	1.44	.507
POST Probing depth	25	1	3	2.40	.645
POSTBOP	25	1	2	1.48	.510
POST Gingival Recession	25	0	1	.56	.507
POST Plaque	25	0	1	.88	.332
Valid N (list wise)	25				

Table 2: Group 2 Chamfer Finish Line

	N	Minimum	Maximum	Mean	Std. Deviation
PRE Gingival index	25	1	1	1.00	.000
PRE Probing depth	25	1	1	1.00	.000
PREBOP	25	0	0	.00	.000
PRE Gingival Recession	25	1	1	1.00	.000
PRE Plaque	25	0	0	.00	.000
POST Gingival index	25	1	2	1.64	.490
POST Probing depth	25	1	3	1.84	.624
POSTBOP	25	1	2	1.20	.408
POST Gingival Recession	25	1	2	1.60	.500
POST Plaque	25	0	1	.84	.374
Valid N (list wise)	25				

Table.3 comparison of the variables among shoulder and chamfer groups: Assessment of gingival index, periodontal probing depth, plaque index, gingival index Ranks

	GROUPS	N	Mean Rank	Sum of Ranks
PRE Gingival index	1	25	25.50	637.50
	2	25	25.50	637.50
	Total	50		
PRE probing depth	1	25	25.50	637.50
	2	25	25.50	637.50
	Total	50		
PRE Gingival Recession	1	25	25.50	637.50
	2	25	25.50	637.50
	Total	50		
PRE Plaque	1	25	25.50	637.50
	2	25	25.50	637.50
	Total	50		

POST Gingival index	1	25	23.00	575.00
	2	25	28.00	700.00
	Total	50		
POST Probing depth	1	25	30.94	773.50
	2	25	20.06	501.50
	Total	50		
POST Gingival Recession	1	25	15.80	395.00
	2	25	35.20	880.00
	Total	50		
POST Plaque	1	25	26.00	650.00
	2	25	25.00	625.00
	Total	50		