

FREQUENCY OF INADEQUATE DIMENSIONS OF OCCLUSAL REST SEAT PREPARED ON 2ND MOLAR ABUTMENTS FOR CAST REMOVABLE PARTIAL DENTURES

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ABSTRACT

Objective: To evaluate occlusal rest seat preparations for cobalt chromium cast removable partial denture.

Materials and Methods: A cross-sectional study was carried out in the department of Prosthodontics, Khyber College of Dentistry, Peshawar starting from June 2014 to June 2015 using consecutive non-probability sampling technique. Data was collected from 127 partially dentate patients having a bounded saddle with a distal abutment as second molar with normal occlusal surface morphology and mesio-occlusal rest seats prepared on the mentioned molar teeth. Patients having partially dentate areas with no principal abutment as second molar and rest seat other than mesio-occlusal rest seat were excluded from the study. Casts were evaluated for aspects of rest seat like the general outline form of the rest seat (visually assessed from the casts), the bucco-lingual and mesio-distal dimensions were measured using a divider and scale. Depth of the rest seat was measured by placing a piece of warm modelling wax with the casts in occlusion and measuring the thickness using Iwenson gauge. Data was analyzed using SPSS 20.

Results: Out of 127 patients, mean age recorded was 38 years with Standard deviation ± 2.15 . Males (62%, n=79) reported more than females (38%, n=48). The most frequently reported inadequate dimension was the depth of rest seat (46%, n=58), followed by the general outline form and mesio-distal width (40%, n= 51). The bucco-lingual dimension was recorded to be inadequate in 37% (n=47) of the cases.

Conclusion: Most of The participants tend to under-prepare rest seat in terms of outline form, width, length and depth.

Keywords: Removable partial denture, Occlusal rest seat, Dental education.

INTRODUCTION

The fabrication of prosthesis to the proposed specifications and the effectiveness of removable partial denture (RPD) depends upon the communication between the dentist and technician, instructions given to the laboratory, the materials used, required

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mouth preparation and designing of RPD. If any aspect is lacking, it will lead to failure of RPD and ultimately patient dissatisfaction with the prostheses. Sometimes both the clinicians and laboratory technicians have inadequate knowledge about the design and principle of components of RPD in particular of clasp which might explain the clinician's divergence from clinical guidelines for prescribing removable prosthesis in general dental practice.^{1,2,3,4,5}

Tooth preparation is required for certain components of RPD like survey line, guide plane and rest seat. Among these rest seat is of particular significance which provide vertical tooth support for RPD free of occlusal interferences. For the success of removable partial denture and to avoid a remake, proper understanding of the functions, design, and placement of occlusal rests is mandatory.^{2,6,7}

The purposes of rest seat are many like transfer of occlusal force through the long axis of the abutment tooth, providing vertical support for the prosthesis while keeping retentive clasps in the correct position etc. For the correct performance of these functions, rest seats must comply with specific sizes and shapes. The outline form of occlusal rest seat should be triangular in shape with the base at the marginal ridge, apex towards the center of the tooth and its floor inclined downwards to the center of the tooth. A minimum bucco-lingual width of 2.0 to 2.5 mm or approximately one-third of the crown or half the inter-cuspal distance had been suggested. The recommended mesio-distal length varies from one-third to one-half of the mesio-distal length of the tooth. A depth of 1 to 1.5 mm at the marginal ridge had been recommended for adequate thickness of cobalt-chromium RPD.^{8,9,10,11}

If rest seats are not properly prepared according to the recommended guidelines, it will consequently lead to caries, gingival recession, periodontal problems and transfer of damaging stresses to the abutment teeth. Farias-Neto et al noted that 63% of the casts were "inappropriate" for rest seat distribution and of these, 57% had no rest seat preparation at all.¹ A study by Culwick et al found that the outline form of the rests prepared by the dental practitioners was often round with sharply defined margins contrasting with the ideal smooth triangular preparation.¹⁰ Rice et al showed that rest seats were either over-prepared or under-prepared, and the inter-occlusal clearance

available for the planned rest was inappropriate. He observed that 60% of rest seats were under-prepared in the mesio-distal plane, 30% were over-prepared in the bucco-lingual plane and 35% had inadequate depth than the recommended dimensions.¹²

The rationale of my study is to record and provide information about inadequate aspects of the prepared occlusal rest seats for RPDs. This study will highlight the magnitude of the problem and suggesting necessary guidelines accordingly for better planning and designing of RPDs by dental practitioners leading to improved quality of prostheses and to patient satisfaction.

MATERIALS AND METHODS

A cross-sectional study was conducted in department of Prosthodontics, Khyber College of Dentistry, Peshawar, from June 2014 to June 2015 using consecutive non-probability sampling technique. Data was collected from 127 partially dentate patients having a bounded saddle with a distal abutment as second molar with normal occlusal surface morphology, no caries, restoration or wear facet and mesio-occlusal rest seats prepared on the mentioned molar teeth. However patients having partially dentate areas with no principal abutment as second molar, faulty dental casts difficult to analyze for various dimensions of rest seats and rest seat other than mesio-occlusal rest seat were excluded from the study. Clinicians having minimum of five years of experience carried out the necessary mouth preparation including the rest seat in the mentioned abutment. Final impressions were recorded for pouring the master casts planned for treatment with the provision of cast RPD. Casts were evaluated for aspects of rest seat like the general outline form of the rest seat (visually assessed from the casts), the bucco-lingual and mesio-distal dimensions were measured using a divider and scale. Depth of the rest seat was measured by placing a piece of warm modelling wax between the upper and lower casts and placing casts into occlusion. The thickness of the resulting wax was measured using Iwanson's gauge. The size of these prepared surfaces was compared with the total size of the corresponding dimension.

Descriptive statistics like mean \pm standard deviation (SD) was calculated for numerical variables like age. Frequency and percentages were calculated for categorical variables like gender and inadequate

Table: 1 Stratification of rest seat inadequate dimensions with Age

REST SEAT INADEQUATE		20-30 years	31-40 years	41-50 years	Total	P Vale
Inadequate General Outline Form	Yes	8	27	16	51	
	No	11	40	25	76	
Total		19	67	41	127	
Inadequate Mesio-distal dimension	Yes	8	27	16	51	
	No	11	40	25	76	
Total		19	67	41	127	
Inadequate Bucco-lingual Dimension	Yes	7	25	15	47	
	No	12	42	26	80	
Total		19	67	41	127	
Inadequate Depth	Yes	9	31	19	58	
	No	10	36	22	69	
Total		19	67	41	127	
Inadequate rest seat as a whole	Yes	7	25	15	47	
	No	12	42	26	80	
Total		19	67	41	127	

aspects of rest seat including general outline form, mesio-distal dimension, bucco-lingual dimension, depth and the rest seat as a whole. Inadequate aspects of the rest seat were stratified among age and gender to see the effect modifiers. All results were presented in the form of tables.

RESULTS

Out of 127 patients, 15% (n=19) were in the age range of 20-30 years, 53% (n=67) were 31-40 years and 32% (n=41) were 41-50 years of age. Mean age was 38 years with Standard deviation ± 2.15. Males (62%, n=79) reported more than females (38%, n=48)

Both the general outline form (40%, n= 51) and mesio-distal dimension (40%, n= 51) was found to be equally inadequate and inadequate depth of rest seat was recorded in 46% (n=58) of the casts. The rest seat as a whole (37%, n=47) and the bucco-lingual dimension (37%, n=47) were recorded to be equally inadequate too.

DISCUSSION

This study supports the findings of other studies in that the participants tend to under-prepare the occlusal rest seat rather than following the recommended guidelines. The general outline form (40%) and the bucco-lingual dimensions (37%) recorded in our

study was similar to findings in a study by Wolfaardt JF et al who showed that 30% of tooth preparation for rest seat have inadequate outline and 28% had inadequate bucco-lingual dimension respectively. However the study showed contrasting results to our study in terms of depth (46%) and mesio-distal dimension (40%) where he reported that 28% had inadequate depth and 57% of rest seats were inadequately prepared in the mesio-distal plane.¹³

Our study was in contrast to a study by Cassim who reported an irregular outline form in 72% of the cases. Narrower rest seat preparations in the bucco-lingual dimension was noted in 81% of the cases rather than the recommended one third bucco-lingual width of the teeth and 72% had inadequate dimensions of rest seat in the mesio-distal plane. He further elaborated that for teeth having shorter mesio-distal length, the mesio-distal length of the rest seat preparation was closer to the recommended minimum one third mesio-distal length of the tooth compared to teeth with a longer mesio-distal length where the discrepancy between the minimum recommended length and the actual length was greater than in the teeth with the shorter mesio-distal lengths. This might be attributed to being over-conservative or a lack of confidence to prepare adequately long rests, for molar teeth. According to the Osborne and Lammie’s cone analogy, a short metal rest on a rel-

Table: 2 Stratification of rest seat inadequate dimensions with Gender

REST SEAT INADEQUATE		Male	Female	Total	P Vale
Inadequate General Outline Form	Yes	32	19	51	0.002
	No	47	29	76	
Total		79	48	127	
Inadequate Mesio-distal dimension	Yes	32	19	51	0.002
	No	47	29	76	
Total		79	48	127	
Inadequate Bucco-lingual Dimension:	Yes	29	18	47	0.001
	No	50	30	80	
Total		79	48	127	
Inadequate Depth	Yes	36	22	58	0.003
	No	43	26	69	
Total		79	48	127	
Inadequate rest seat as a whole	Yes	29	18	47	0.001
	No	50	30	80	
Total		79	48	127	

atively longer tooth (mesio-distally) would produce more torqueing forces when loaded. However, molar teeth with their multi-rooted systems and not being cone shaped, the effect of the force transmitted to them via a relatively short cast metal occlusal rest is unknown.

Shallower rest seat preparation with less than the recommended 1 mm depth was reported in 66% of the cases and 75% of cast metal rests for these rest seat preparations were 1mm or thicker. This suggests that the technicians over bulked the cast metal rests. These cast metal rests could interfere with the occlusion in the presence of an opposing dentition. The 19% cast metal rests were not as thick as the clearance provided for them and topography of the tooth can't be optimally restored. The technicians most likely will have cast thinner rests than the recommended minimum of 1mm thickness or they might have adjusted it to fit into occlusion against the opposing dentition.¹⁴

The limitation of our study is that teeth other than second molar were not taken into consideration as well as the knowledge and skill of practitioners were not judged. Further studies about the materials, skill and knowledge of both the dentists and technicians must be assessed so as to ensure the fabrication of a successful prostheses and ultimately patient satisfaction.

CONCLUSION

This study shows that the participants tend to under prepare rest seat in terms of width, length and depth. The frequency of inadequate aspects of occlusal rest seat prepared on principal molar abutments in patients planned for the provision of cobalt chromium removable partial dentures varied greatly in all planes including the inter-occlusal clearance and further emphasis should be given to aspects of denture design in undergraduate, continuing education program for dentists and the need for 'a refresher' in tooth modification and rest seat preparation to ensure the long term successful outcome for their prostheses.

Significance

This study will highlight the deficient aspects of occlusal rest seat and will be helpful in predicting the strategies to resolve them.

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