

OCCLUSAL CONTACTS IN CENTRIC RELATION RECORDED INTRAORALLY AFTER PROCESSING HEAT CURED ACRYLIC RESIN COMPLETE DENTURES

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ABSTRACT

Objective: To record the occlusal contacts in centric relation at the first insertion stage of complete denture.

Materials and Methods: A cross-sectional study was conducted in Prosthodontics department, Khyber College of Dentistry, Peshawar starting from August 2019 to December 2019 using consecutive non-probability sampling. Data was collected from 30 conventional heat cured processed and finished acrylic resin complete dentures (CDs) first inserted into the mouth by checking occlusion in centric relation (CR). Patients having neuro-muscular problems and temporo-mandibular disorders (TMD's) were excluded from the study. Data was analyzed using SPSS 20.

Results: Out of thirty CD patients, mean age recorded was 61 ± 5 years and males (60%, $n=18$) reported more than females (40%, $n=12$). Most of the participants (83.3%, $n=25$) didn't perform a remount procedure. Bilateral occlusal contacts (56.7%, $n=17$) were recorded more than Unilateral contacts (43.3%, $n=13$). Majority of CDs had 6-10 number of occlusal contacts in CR after processing (46.7%, $n=14$). Of those who hadn't performed a laboratory remount, the number of occlusal contacts in the range of 6-10 were noted to be highest (40%, $n=12$).

Conclusion: Proper processing techniques and a laboratory remount after processing must be performed to ensure a good occlusal practice in CD wearers.

Keywords: Complete denture, Acrylic resin, Centric relation. Occlusal adjustment.

INTRODUCTION

Complete denture occlusion is important for stability of denture bases, uniform distribution of occlusal loading on the stress bearing areas and patient satisfaction. Factors which affect the occlusal relationship of teeth on complete dentures include unstable trial denture bases for maxilla-mandibular relationship record and errors in their transfer to the articulator, inaccurately established vertical and

horizontal dimensions of occlusion, incorrect arrangement of artificial teeth, inherent wax instability, incorrect monomer-polymer ratio, excessive use of pressure during packing of the acrylic resin into the flask, improper flask closure during polymerization of acrylic resin, warpage of denture base due to release of inherent strains when the denture is separated from the cast, overheating of the finished dentures during finishing and final polishing of CD etc.^{1,2,3} All of these might result in alteration in number of occlusal contacts, occlusal plane and vertical dimension of occlusion thus affecting denture stability and retention. Ideally there should be no tooth movement during processing of dentures. However processing errors are inevitable and movement of teeth does take place during processing regardless of the meth-

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od of investment and type of polymerization used. Tooth movement occurred in all three directions, mesio-distal, antero-posterior and vertical. This undetected error, on the part of the clinician or the technician, might go unnoticed until the dentures are placed in patient's mouth jeopardizing the number and distribution of occlusal contacts.^{4,5,6}

For an ideal occlusion (Angle class I), 24 to 40 contacts are thought to exist between the opposing posterior permanent teeth (including the canines), without taking the third molars into consideration. Studies found that in natural dentition, the average number of posterior contacts in inter-cuspal position varies from 9.6 to 24.8 contacts. For achieving the requirements of CD occlusion, it can be expected that each functional cusp in maximum inter-cuspal position should have at least one occlusal contact with the opposing occlusal surface.⁷

Due to the inherent instability of denture bearing area, nature of the mucosa and difficulties in performing excursive movements and recording CR, direct determination of occlusion intra-orally and correction of occlusal contacts by grinding denture teeth is a less precise and difficult method. So occlusion must be checked via a remount procedure after polymerization of denture bases and before CDs are given to the patient. Both clinical and laboratory remount is used to locate the occlusal errors. Occlusal errors in CDs include errors in centric occlusion, during protrusive movements, on the working and non-working (balancing) side. Gross occlusal discrepancies might even require remake of either one or both the complete dentures. CR is determined once again by a remount procedure and final correction of possible occlusal disharmony/errors is carried out by selective grinding in order to eliminate deflective occlusal contacts and achieve the centric stops.^{1,3,8,9}

Despite of its recommendation in theory, most of the practitioners do not perform a remount. A study by Patel et al mentioned that only 6.5% of general dental practitioners remounted the dentures to adjust the occlusion.³ Atashrazm et al noted that the number of bilateral and unilateral occlusal contacts were present in 138 (68%) and 65 (32%) of the cases respectively.⁷

The objective of this study is to assess the occlusal contacts in CR after CD processing by undergraduates, postgraduates and house officers. This

study will facilitate them in identifying the cause of occlusal disturbances during the various laboratory steps of CD construction and will highlight the importance of a laboratory remount procedure.

MATERIALS AND METHODS

A cross-sectional study was conducted in Prosthodontics department Khyber College of Dentistry, Peshawar starting from August 2019 to December 2019. Thirty conventional heat cured compression molded processed and finished acrylic resin CD's were taken into consideration. Patients having class I ridge relationship were included whereas those having neuro-muscular disorders, TMD's and patients above 70 years of age were excluded from the study. Anatomic teeth were used and bilateral balanced occlusion was selected as the occlusal scheme of choice. Ideal contacts were established at the wax try-in stage. Processed Dentures were checked in the mouth for adaptation of denture borders and denture bearing surfaces by using pressure indicating paste and were relieved as required.

If a laboratory remount was performed, it was recorded as "Yes". Occlusal contacts on remounted casts were noted and selectively grinded till pre-processed occlusal contacts were achieved. Occlusal contacts in CR were noted intra-orally, both unilaterally and bilaterally, using 60 microns articulating paper and were evaluated extra-orally. The number of teeth involved in CR and the total number of occlusal contacts on every tooth was noted.

The data was coded, entered and analyzed using SPSS version 22. Descriptive statistics, like mean and median, were calculated for age, gender, a remount performed, total number of occlusal contacts, bilateral and unilateral occlusal contacts. Frequencies and percentages were calculated for all other variables. The relationship of a remount procedure to the total number of occlusal contacts as well as unilateral and bilateral occlusal contacts was noted by Chi-square test. All data is presented in tabulated form.

RESULTS

The mean age recorded was 61 years ± 5 , with age ranging from 54-70 years. Out of 30 patients, 60% (n=18) were males and 40% (n=12) were females. Only 16.7% (n=5) performed a laboratory remount after processing while the rest (83.3%, n=25) didn't

perform a remount at all. Bilateral occlusal contacts were recorded in 56.7% (n=17) while 43.3% (n=13) had unilateral contacts.

Table: 1 Total Number of Occlusal contacts

S.No	Number of Occlusal Contacts	Frequency N (%)
1	0-5	4 (13.3%)
2	6-10	14 (46.7%)
3	11-15	5 (16.7%)
4	16-20	5 (16.7%)
5	21-25	2 (6.7%)

Table: 2 Influence of Remounting on Number of Occlusal contacts

Remounting	Number of occlusal contacts					Total N (%)
	0-5 N (%)	6-10 N (%)	11-15 N (%)	16-20 N (%)	21-25 N (%)	
Yes	0 (0%)	2 (6.6%)	0 (0%)	2 (6.68%)	1 (3.35%)	5 (16.7%)
No	4 (13.3%)	12 (40%)	5 (16.7%)	3 (10.02%)	1 (3.35%)	25 (83.3%)
Total	4 (13.3%)	14 (46.6%)	5 (16.7%)	5 (16.7%)	2 (6.7%)	30 (100%)
P- value	0.247					

Table: 3 Bilateral and Unilateral Occlusal contacts in relation to Remounting

Remounting	Occlusal Contacts		
	Unilateral N (%)	Bilateral N (%)	Total N (%)
Yes	2 (6.66%)	3 (10%)	5 (16.7%)
No	11 (36.64%)	14 (46.7%)	25 (83.3%)
Total	13 (43.3%)	17 (56.7%)	30 (100%)
P- value	0.027		

DISCUSSION

The movement of teeth during processing of CD disturbs the harmonious occlusal scheme established at the final wax try-in stage.¹⁰ The absence of simultaneous bilateral contacts between the opposing posterior teeth in CR during function will make the dentures unstable, leading to a variety of deleterious local, dental and masticatory system effects like discomfort, trauma and damage to the underlying tissues. Therefore, occlusion of the finished dentures must be free of interferences and if any, should be corrected by applying the related rules and concepts so as to improve the acceptance of patient. However this is ignored usually and the patient complains of

post-operative discomfort or pain, which is temporarily relieved by adjusting the fitting surface of denture without regard to occlusion.^{11, 12, 13} Lab and Clinical remount at the time of delivery improves patient's comfort, acceptance of CD and reduces the number of follow up visits. Our study was similar to the one which showed that the mean number of occlusal contacts significantly decreases with processing. Twenty-five (81%) out of 31 CD with occlusal disharmony were not clinically remounted.¹⁴ This was much similar to our study where 83.3% didn't perform a lab remount. Atashrazm et al after denture processing noted bilateral and unilateral occlusal contacts in 87.6% and 12.4% respectively 6 which was in contrast to our study where bilateral contacts

were reported in 56.7% of the cases. The number of occlusal contacts of remounted complete dentures in CR was recorded by Atashrazm et al where 75% had four and less occlusal contacts, 25% had five and more occlusal contacts 7 which was in contrast to our study where 46.7% had 6-10 occlusal contacts.

Our study was on conventional heat cured acrylic resin which might be one of the reasons of such occlusal errors noted showing that methods of polymerization must be changed to injection molding methods as Chintalacheruvu et al showed that the less number of interferences give an indication of minimal three-dimensional positional changes of teeth with injection molding technique as compared to compression molding technique indicating the advantages of injection molding systems over compression molding system.¹⁵

The literature lacks information on occlusal changes like number, distribution and loss of contacts before and after processing and methods for evaluating these changes. However, this fact is often observed in clinical practice and further studies for evaluation of occlusal contacts and influence of material and techniques are required. The main limitation of our study was that no consideration was given to eccentric occlusion, as well as the inability to supervise all of the laboratory steps in processing CDs.

CONCLUSION

The number of occlusal contacts definitely reduced after processing and especially when a lab remount procedure was not done. To avoid occlusal errors in CR due to linear and vertical tooth movement, processing procedures must be meticulously performed and suggested preventive measures must be followed by dental technicians, clinicians and students. However some tooth movement does take place despite of the most sophisticated techniques and materials used. So it is highly recommended to routinely follow the lab/clinical remount procedure for fabricating dentures so as to refine the occlusion of CD after laboratory processing of the dentures before its delivery and to reduce the chances of patient dissatisfaction.

Significance

Since more time is needed to adjust the occlusal errors, therefore appropriate techniques and measures must be devised in order to keep these changes

to a minimum or ideally should not be present.

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