An Evaluation of Occlusal Contacts of Remounted Complete Denture before Final Occlusal Adjustment

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ABSTRACT

Statement of problem: There are various studies about the advantages and effect of remounting procedures on success of complete dentures; however, the number and distribution of occlusal contacts of remounted complete dentures before occlusal adjustment have not been sufficiently assessed.

Purpose: The purpose of this study was to evaluate the distribution and number of occlusal contacts of remounted complete dentures in centric relation before occlusal adjustment

Materials and Methods: In this cross-sectional study, 207 newly constructed complete dentures were remounted on a modified two dimensional articulators. For identification of occlusal contacts, a 60 micron articulating paper was used to mark the actual contacts of the opposing teeth. The articulating paper was interposed between the teeth, and contacts were obtained by holding the articulating paper between the opposing teeth. The number and distribution of the occlusal contacts on each complete denture in centric relation were recorded and analyzed, using descriptive statistics.

Results: Out of the 207 studied complete dentures, 203 had occlusal contacts. Among 203 complete dentures, 138 (68%) and 65 (32%) had bilateral and unilateral occlusal contacts, respectively. The total number of occlusal contacts was 713 with a range of 1-14. The mean number of occlusal contacts was 3.44 ± 2.29

Conclusion: The results suggest that the number of occlusal contacts of remounted complete dentures before occlusal adjustments by articulating paper was low, the posterior teeth did not meet evenly all around the arch at the first contact, and delivery of such complete dentures may lead to occlusal error and unstable complete denture.

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Introduction

Most dental schools teach the importance of remount procedures on the analysis, identification, and refinement of the complete dentures occlusion once the complete dentures have been finished [1-3]. There is usually agreement amongst prosthodontists to do this approach [4]. However, general dentists usually prefer other quicker and intra-oral methods for correcting complete denture occlusion [5]. There are various reasons for doing clinical remount including a change in the state of the tempormandibular joints, inaccurate centric relation records, errors in the transfer of maxillo-mandibular relation records to the articulator, failure to seat the occlusion rims correctly on the casts, ill-fitting temporary bases, processing errors, polymerization contraction of polymethyl methacrylate, displacement of the edentulous

mucosa, and unfavorable oral anatomy [6-11]. Also, it is emphasized that occlusal adjustment can eliminate occlusal errors and increase the number of occlusal contacts of complete denture. This procedure has a positive impact on the comfort and satisfaction of patients with complete denture [3].

Although a great deal has been published about advantages of the clinical remount and the procedures involved in a remount procedure for correcting occlusal error of newly constructed complete dentures [12-18], there are few studies on the distribution and number of occlusal contacts of the remounted complete denture before occlusal adjustment in the literature.

There is some debate that there may be sufficient occlusal contacts and even distribution of these contacts in newly constructed complete denture without clinical remount occlusal adjustment and it may not be necessary to do this time consuming and difficult tasks. In other words, there should be an evidence based study on the performance of this task. This is the major reason for skipping and avoiding the clinical remount procedure by general practitioners [19].

Due to this prolonged debate and lack of information about the pattern of occlusal contacts of complete denture before insertion, this study attempted to evaluate the number and distribution of occlusal contacts of the newly constructed remounted complete dentures in centric relation by means of a pre-contact interocclusal record before occlusal adjustments.

Materials and Methods

In this descriptive cross-sectional study, a total of 207 patients attending the Removable Prosthodontics Department of Islamic Azad dental school in Tehran in 2008 for complete denture prosthodontics treatment were included. All the patients were completely edentulous in both maxillary and mandibular arches. The complete dentures were made under supervision of faculty members according to the standard protocol in reference textbooks [6]. The basal surface errors were eliminated before evaluating the occlusal contacts of remounted complete dentures. The mean age of the patients was 58.72 years with a range of 31-86 years. 132 (64%) patients were male and 75 (36%) were female. The mean duration of complete edentulousness was 66.35 months.

In order to locate the occlusal contacts of newly constructed complete denture before insertion, the following standard protocol for remounting was done [6]. A remounting cast was made for each complete denture. The mandibular denture was stabilized by the operator, placing both index fingers intraorally on the buccal flanges with the thumb extraorally on the chin, whilst guiding the jaw into centric relation. The centric relation was recorded, using bite registration compound (GC Corporation Tokyo, Japan). Maxillary and mandibular complete dentures were mounted on a modified two-dimensional articulator (Model 96 H_2, Teledyne, Hanau, Buffalo, N.Y) by means of face- bow (Teledyne, Hanau, Buffalo, N.Y) registration record and centric relation record, respectively. In order to verify the accuracy of the original centric relation records [6], the second centric relation was recorded for each patient and examined on the articulator by a calibrated prosthodontist. The assessment of the occlusal contacts of complete dentures was also done by the same examiner.

For identification of occlusal contacts, first the incisal guide pin was relieved of contact on the incisal guidance table. A 60 micron straight strip articulating paper (Bausch KG, Köln, Germany) was used to mark the actual contacts of the opposing teeth. Occlusal assessment process involved marking the occlusal contacts and also by attempting to pull the articulating paper between the opposing teeth when the articulator was closing. If the markings produced by articulating paper coincided with the engagement of articulator paper by the opposing teeth, i.e. when articulator paper met resistance when an attempt was made to withdraw it from between the opposing teeth, it was identified as an occlusal contact. The procedure of occlusal contact identification was repeated for each tooth separately from the most distal posterior tooth of one side to the most distal posterior tooth of other side. If there was no contact between the opposing teeth, the articulating paper was interposed between the

opposing denture bases for identification of the opposing dentures contact. The number and distribution of the occlusal contacts on each complete denture in centric relation were recorded. The data were collected, and then the frequency and the relative and cumulative percentages were analyzed, using descriptive statistics.

Results

The complete denture patients' data are given in Table 1. Out of the 207 remounted complete dentures, 203 had occlusal contacts, among which 190 complete dentures had contacts on the posterior teeth and 13 on both the posterior and anterior teeth. Four complete denture did not have any occlusal contact. Contacts were observed on the denture base on the tuberosity and retromolar area in which two was bilateral and others unilateral.

Table 1 Data for 207 remounted complete dentures in centric relation

Complete dentures with occlusal contacts	Yes	03
	No	4
Occlusal contacts	Mean	3.44
	SD	2.29
	Total	713
Tooth contacts	Mean	5.88
	SD	3.41
	Total	1217
Frequency distributions of occlusal contacts	Bilateral	138(68%)
	Unilateral	65(32%)

The frequency distribution of occlusal contacts of 203 remounted complete dentures were 138(68%) bilateral and 65 (32%) unilateral, respectively. Out of the 65 complete dentures with unilateral occlusal contacts, 34 had contacts on the right side only and 31 complete dentures on the left side.

The total number of occlusal contacts was 713 with an occlusal contact range of 1-14 numbers. The mean number of occlusal contacts was 3.44±2.29 and that of bilateral and unilateral occlusal contacts was 4.35±2.69 and 1.87±1.76, respectively. The total number of the teeth with occlusal contacts was 1217 with a mean of 5.88±3.41. The frequency of occlusal contacts of remounted complete dentures in centric relation is presented in Table 2. Out of the 203 complete dentures, 75% had four and less occlusal contacts, and 25% had five and more occlusal contacts.

Discussion

There are some factors pertaining to the functional harmony of the complete dentures, the most important of which are the occlusal surfaces [20]. Therefore, if the occlusal contacts are not even through the entire arch, the main goals of the prosthetic therapy will not be achieved.

In the present study, the mean number of the teeth with occlusal marks and the mean number of occlusal contacts were 5.88 and 3.44, respectively and they were not evenly distributed.

Table 2 Frequency distribution of the number of occlusal contacts of remounted complete dentures in centric relation before occlusal adjustment

Frequency Number of occlusal contacts	Number of Complete Denture	Relative percent	Cumulative percent
14	1	0.48	0.48
12	1	0.48	0.96
11	4	1.9	2.9
10	2	0.96	3.84
9	1	0.48	4.32
8	5	2.4	6.72
7	2	0.96	7.68
6	14	6.7	14.38
5	23	11.2	25.6
4	35	16.9	42.5
3	38	18.4	60.9
2	39	18.9	79.7
1	38	18.4	98.1
0	4	1.9	100
Total	207	100	

In a recent study, it was demonstrated that the mean number of the teeth with occlusal marks and the mean number of occlusal markings for the remount methods in centric relation were 5.65 and 7, respectively [2]. The results of their study are in agreement with those of the present study. They measured the mean number of occlusal marks (seven occlusal marks) of remounted complete dentures in centric relation in 147 complete dentures. Each occlusal contact was the sum of two occlusal marks. They also measured the mean numbers of occlusal markings and the number of teeth with occlusal markings when the patients were biting freely and the mandibular denture was stabilized (both intraorally). They demonstrated that the mean number of occlusal markings and the mean number of teeth with occlusal markings were 11.65 and 8.82 for mandibular denture stabilized. The mean number of occlusal

marking and the teeth with occlusal markings were 12.65 and 9.24 for freely biting complete dentures. They used 65 microns horseshoe articulating paper to simultaneously disclose bilateral occlusal contacts, and measured the occlusal marks on the occlusal surfaces of the complete dentures by photographs which developed as slides for projection, but we measured the number of occlusal contacts.

The occlusal contacts in our study were obtained from two occlusal marks of the opposing teeth, i.e. feeling of occlusal contacts or engagement of articulating paper (Bausch straight strips 60 microns) between the teeth which was recorded as an occlusal contact. This articulating paper was tear-resistant and coated with liquid colors on both sides. There are many different types of articulating papers available commercially in varying thicknesses. The most commonly used ones in general practice and technical laboratories for complete denture work are 'Detex' (40 microns Associated Dental Products, Swindon, UK); Radar (40 microns, SVEDIA, Sweden), Ariadent articulating paper (100 microns, Ariadent, Tehran, Iran), and 60 micron articulating paper (Bausch KG, Köln, Germany). The thickness of the papers will have an effect on the occlusal contact and marking schemes achieved [21]. The thicker the paper, the more the likelihood of false occlusal contacts. There are other methods such as wax, dimensional digital technique, photo- occlusion technique and transparent acetate sheet which have been introduced in the literature [22]. This study, however, aimed to locate occlusal contacts by articulating paper based on the most widely used approach in daily clinical and technical laboratories. It should be emphasized that the use of articulating paper intra-orally leads to additional spurious occlusal contacts compared to a remount method [2,22].

In natural dentition, studies have shown different results for the average number of posterior contacts in intercuspal position, varying between 9.6 [23], 18.5 [24], and 24.8 [25] contacts. Also, there are suggestions for an ideal normal occlusion (Angle class I), where 24 to 40 contacts are thought to exist between the opposing posterior permanent teeth (including canines), without taking the third molars into account [26]. However, there is no evidence to support this concept in complete denture occlusion, but for achieving the requirements of complete denture occlusion, it can be expected that each functional cusp in maximum intercuspation position should have one occlusal contact with the opposing occlusal surface. This number in our study was measured to be eight and more in 5%, and three and less in 58% of the remounted complete dentures, respectively. Moreover, one third of the remounted complete dentures showed unilateral occlusal contacts. The number and distribution of the occlusal contacts in this study and the results of Wilson et al [2] study are less than the satisfactory minimum. Though this minimum number of occlusal contacts is not clearly quantified and stated throughout the prosthodontics literature. In complete denture with three posterior teeth (one premolar and two molars) with one occlusal contact for each functional cusp, the minimum number of occlusal contacts which should be considered for achieving a desirable occlusion is twenty occlusal contacts.

Finally, complete denture construction involves several extended treatment episodes and several technical laboratory procedures; processing of the complete denture includes 43 steps [27]. These procedures may jeopardize the efficient number and distribution of occlusal contacts and dramatically increase the chance of occlusal errors.

Conclusion

Within the limits of this study's design, the evaluation of the number and distribution of occlusal contacts of the remounted complete dentures before occlusal adjustment revealed unevenly distributed and insufficient occlusal contacts in centric relation, having negative impacts on the objective of complete dentures treatment.

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