The influence of double flask processing in occlusal plane when a couple of dentures are processed in occlusal position

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Abstract
Equilibrate occlusion system is an important goal in oral rehabilitation. This occlusal scheme is established when the denture teeth are placed in the plane of orientation, and could be changed by alterations related to polymerization resin process. The aim of this research was to evaluate vertical occlusal plane changes after processing, using two types of flasks: a conventional single flask (C), and a flask designed to process upper and lower denture simultaneously in occlusal position (HH). Twenty double dentures (upper and lower) were reproduced by a maxilla and mandible master metallic models simulating edentulous upper and lower couple arches. Four metallic apparatus simulating molar and canine cusps were placed on plane of orientation at molar and canine positions of all dentures. The Group I couple samples were processed individually using single conventional flask (C), and the ten couple samples of Group II were polymerized using a flask designed to process upper and lower denture simultaneously, in optimal positioning teeth (HH). A linear measurement instrument measured the distance between metallic top of each cusps and the cast bone before and after dentures processing. The data were analyzed by z test at 95% confidence level, and made possible to verify that the modification occurred in Group I were aleatory, with prevalence of negative results to upper and lower dentures. In Group II samples was observed that occurred regulars movements of metallic patterns in function of their antagonists, showing homogeneous alterations on patterns. Was observed statistical difference between group I and Group II samples, were Group II exhibited better results of occlusion teeth accuracy after processing than Group I samples.

Key Words
Denture, processing, occlusion
Introduction

One of the most important objectives of complete dentures is to establish the dental equilibrate occlusal scheme, harmonized with structures of masticatory system. However, adequate occlusion contacts achieved in artificial teeth placement during clinical proves are usually altered after denture processing, causing serious problems in Temporomandibular system. Inadequate occlusal contacts on polymerized dentures have provenance in clinical or laboratory procedures, as inadequate techniques, deficiency of material, temperature of curing temperature, or inadequate occlusal evaluation scheme during denture placement and checking. Clinical and laboratory errors influence success of a rehabilitation treatment. Although they could be avoided or corrected by clinical procedures, the problems of acrylic resin dimensional alterations aren’t solved yet.

Material and techniques used in processing dentures could introduce errors in finished dentures. Acrylic resins suffer dimensional alterations during processed promoting sensible distortion on denture base and occlusal teeth. During polymerization process, acrylic resin presents change that induces permanent modifications on denture base, mainly due to polymerization shrinkage. It could modify the teeth relationship and originates an inadequate occlusion or mandibular position. This fact alerts the dentist about the necessity of occlusal adjustments before delivering dentures to the patient.

A specially designed flask, which allows simultaneous flasking of a pair of complete dentures in maximum occlusal position, was designed to minimize occlusal artificial teeth modifications generated by acrylic resin dimensional alterations, and denominated HH. When upper and lower dentures are polymerized simultaneously in maximum occlusal on HH flask, teeth position alterations could be reduced.

The aim of this research was to evaluate vertical occlusal plane changes in pair of dentures after processing, using two types of flasks: a conventional single flask, and the HH flask, that permits to process simultaneously the upper and lower dentures in bite occlusion.

Material and Methods

A blind experiment was done by twenty randomly double dentures (upper and lower), which were reproduced by a maxilla and mandible master metallic models simulating edentulous upper and lower pairs of arches. Metal maxilla and mandible master-casts were obtained by impressions of a edentulous patient, and duplicated by polyvinyl siloxane. The twenty type III stone casts duplicated by master-casts received a central perforation and three cavities in its opposite side. Metal master-casts were positioned in an adjustable articulator, and artificial teeth placed on wax planes of denture bases. The upper master-cast was substituted by a duplicated stone cast, fixed in articulator by wax, and a screw was placed across the previous perforation and fixed to the stone cast. This wax connecting cast was substituted by heat-cured acrylic resin, permitting that all casts could be positioned in the same place on articulator in any experimental period. Same operation was done to lower cast. The dentures were constructed in this condition and the same operator realizes all procedures.

Four metallic apparatus simulating molar and canine cusps were placed on a wax plane, in the molar and canine positions of all dentures. These apparatus were waxed in occlusion with its respective antagonists. Ten pairs of dentures were divided in two groups: Group I dentures were processed individually using single conventional flask (C); and Group II, dentures were included into the HH flask, designed to process upper and lower denture simultaneously in optimal occlusal positioning teeth (HH) (Figure 4). All samples were positioned on metal master-casts. The distance between metallic top of each cusps and the cast bone, was determined by four metal spots in metallic device, measured by a linear measurement microscope instrument (Carl Zeiss – Jena, Germany), before and after denture processing. The difference between first and second distance was obtained to each measurement. The data were organized in table and submitted to z test at 95% confidence level. Vertical Dimension of occlusion were checked by anterior pin position of the articulator when the pairs of dentures were re-positioned in articulator after processing.

Fig. 1 - Wax connecting the casts.
Results

Graphic presentations of differences among first and second measurements in metroscope were presented in Figure 6 (Group I) and Figure 7 (Group II), and the data were expressed in millimeters. Test z showed significant difference between average distances using conventional or HH flask.

In none situation the incisal pin touched the incisal guide plane when the after cured samples of the Group I were repositioned in articulator. On opposite, that occurs to a little number of samples when Group II samples were mounted in articulator.

Fig. 2- Schematic presentation of the specially designed metallic device simulating posterior teeth.

Fig. 3. Metallic device mounted over the wax in maximum intercuspsation position.

Fig. 4. Schematic presentation of the flask designed to polymerize upper and lower dentures together in maximum intercuspsation position.

Fig. 5. Measurements in horizontal metroscopic (Carl Zeiss – Jena, Germany).

Fig. 6. Graphic presentation of the differences among the first and second measurements for Group I.
Discussion
To minimize the occlusal consequences of these alterations and to avoid a larger number of appointments, a special flask was designed to polymerize upper and lower dentures simultaneously, in maximum occlusion teeth position. This special flask was denominated HH. In this experiment, occlusal changes presented by pairs of complete dentures were observed when comparing dentures processed in HH flasks and single conventional flasks. Results permitted verify that measurement alterations of the dentures processed in conventional flasks varied randomly, promoting premature contacts in complete dentures occlusal scheme. To the dentures processed in HH flasks values also varied, but those alterations occurred in a regular pattern. The metallic devices of upper and lower dentures dislocated to same direction, promoting compensation between the movements. That could promoted better harmony among occlusion, preventing alterations in vertical dimension. These dimensional increases could be easily observed in incisal pin location before and after processing\(^4\). In this experiment was observed that occurred vertical alterations in both groups. But after conventional flask processing, the incisal pin did not touch incisal guide for any pair of samples. In opposite, guide pin touched incisal guide in several HH flask samples.

Conclusion
Considering the described methodology, this experiment permitted to conclude that:
1. In both groups occurred occlusal changes after dentures processing;
2. Occlusal changes were observed when pairs of dentures were processed in conventional single flasks;
3. Occlusal changes occurred to the same direction when pairs of dentures were processed simultaneously in HH flasks;
4. The HH flasks reduced vertical dimension changes on pairs of dentures when they are processed simultaneously in HH flasks.

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References