Original Article

Evaluation of Four Elastomeric Interocclusal Recording Materials

Maj P Dua*, Gp Capt SH Gupta+, Lt Col S Ramachandran#, Lt Col HS Sandhu**

Abstract

Background: The fabrication of dental prosthesis requires the transfer of interocclusal records from patient's mouth to semi-adjustable articulators using different kinds of recording media. Any inaccuracy in these interocclusal records leads to occlusal errors in the final prosthesis. This study was conducted to evaluate the dimensional changes occurring in the interocclusal recording material over a given period of time and the material's resistance to compression during the cast mounting on the articulator.

Methods: In this in vitro study, the linear dimensional change and compressive resistance of four commercially available elastomeric interocclusal recording media was tested. Three were addition silicones and the fourth was a polyether material. Cylindrical samples of 10mm diameter of each material were prepared in three different thicknesses of 2, 4 and 6mm. Ten samples each of thickness of 2, 4 and 6mm for all four materials were prepared (total of 120 samples). The linear dimensional changes of the samples were evaluated after 24 hours of fabrication. The compressive resistance was measured when each of these was subjected to a constant compressive load of 25 Newtons.

Results: The mean linear dimensional change in a horizontal plane was minimum for Kanibite Hard, an addition silicone. Ramitec showed the maximum linear dimensional change. The mean compression distance was least for Futar D Occlusion (an addition silicone) and maximum for Ramitec (a polyether). It was observed that the samples of thickness 2mm for all the materials underwent least compression.

Conclusion: The compressive resistance of each elastomer was inversely proportional to the thickness of the sample. This implies that minimum thickness of the recording materials should be used for recording maxillomandibular relations without sacrificing the strength of the interocclusal record.

MJAFI 2007; 63 : 237-240

Key Words: Interocclusal records; Articulation; Occlusion; Linear dimensional change; Compressive resistance

Introduction

The fabrication of an immaculate prosthesis requires that the articulator should simulate the patient's mandibular movements as closely as possible. These articulators require interocclusal records for mounting casts and programming articulators. Any inaccuracy in interocclusal records leads to occlusal errors in the final prosthesis.

Many materials are available for interocclusal registration. These include waxes, metallic pastes, plaster, acrylic resins and elastomeric materials. Adequate laboratory facilities are commonly not available locally and casts have to be sent to other laboratories for articulation. In these situations, the patient's interocclusal records are made and sent along with the cast to the laboratory. This requires that the records must be dimensionally stable for a given period of time before they are used to articulate the casts. A compressive force is commonly exerted on the recording material during the articulation procedure which may cause inaccuracies during mounting of casts. Each of these interocclusal recording materials exhibits a degree of deformation when compressed under a load. The deformation may vary with the thickness and the properties of the recording materials used. The present study was undertaken to evaluate the linear dimensional change, compressive resistance and effect of varying thickness on the compressive resistance of four elastomeric interocclusal recording materials.

Material and Methods

Four types of interocclusal recording media were used in the study. Three were addition silicones ('Regisil Rigid', 'Futar D Occlusion', 'Kanibite Hard') and one a polyether material ('Ramitec').

A cylindrical brass master cylindrical die was machine tooled for the purpose of this study (Fig.1,2). Three brass

*Graded Specialist (Prosthodontics) OC, Military Dental Centre, Amritsar-143001. +Classified Specialist (Prosthodontics), Air Force Institute of Dental Sciences, Agram Post, Bangalore - 560007. #Associate Professor (Prosthodontics), Dept of Dental Surgery, AFMC, Pune. **Classified Specialist (Prosthodontics), 33 Corps Dental Unit, C/o 99 APO

Received : 28.06.2005; Accepted :19.12.2005

trays of 10mm internal diameter were machine tooled to fit snugly over the cylindrical master die in the form of hollow cylinders, open at both the ends. When the custom trays were snugly positioned over the die, the difference in the heights of the trays and that of the die varied 2mm, 4mm and 6mm depending upon the height of the tray used. 30 test samples for each of the four materials were fabricated with 10 samples of 2mm, 4mm and 6mm thickness each (Fig. 3). Thus a total of 120 samples were fabricated. These groups were designated as: Group A (Regisil Rigid), Group B (Futar D), Group C (Kanibite Hard) and Group D (Ramitec). The 30 samples of each group were further subdivided into 3 subgroups of 10 samples each. These subgroups were designated as Subgroup I of 2mm thickness, Subgroup II of 4mm thickness and Subgroup III of 6mm thickness.

The samples were stored in tightly sealed containers and kept for 24 hours in an air-conditioned room at 25˚C before evaluating the linear dimensional change using a universal measuring machine (Fig. 4). Each of the test samples was loaded on an Instron testing machine (Fig. 5) and subjected to a constant compressive force of 25 Newton for a duration of one minute. The linear dimensional changes were tabulated and analysed by using one-way ANOVA test. The results were further subjected to a statistical analysis using the two-way analysis and the one-way analysis of variance for compression distances between interocclusal recording materials.

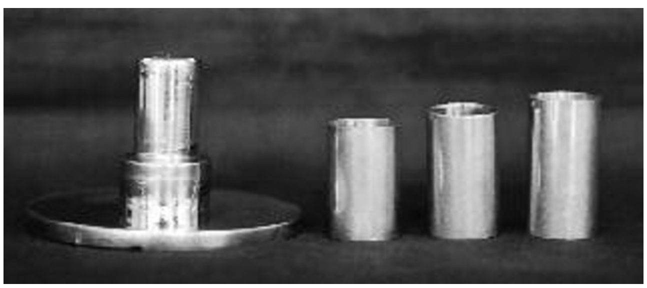

Fig. 1 :

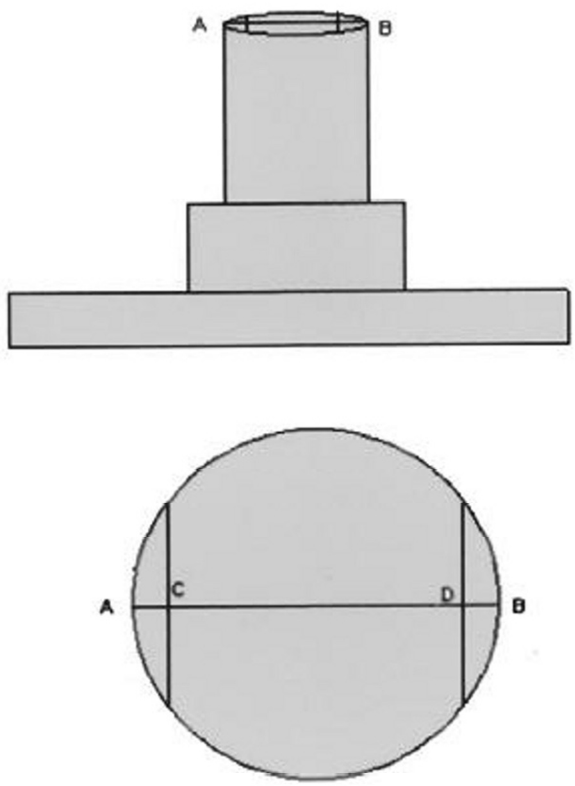

Fig. 2 :

Results

Linear dimensional changes of the samples were tested by measuring the length of line C-D imprinted on the test samples by means of a universal measuring machine. Group C was found to exhibit the least dimensional changes in the horizontal plane (0.10%), followed by Group B (0.19%), Group A (0.22%) and Group D (0.31%) (Tables 1, 2).

The compressive resistance was measured by finding out the compression distance on an Instron Universal Testing Machine, under a constant compressive force of 25 Newton. For each of the thickness, there was significant difference in compression between the four types of materials ($p < 0.001$).

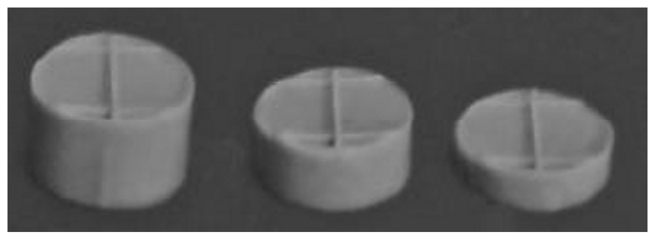

Fig. 3 :

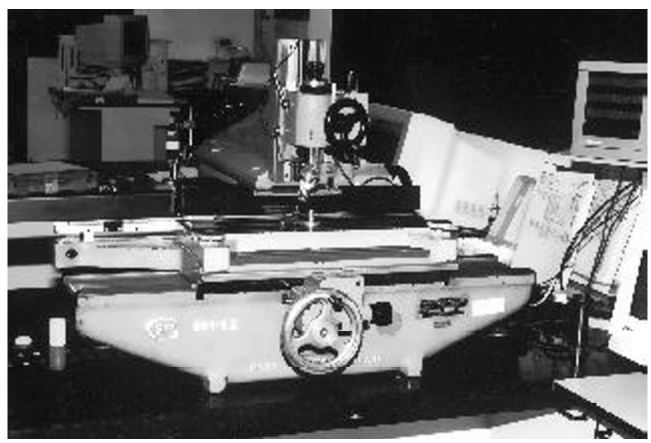

Fig. 4 :

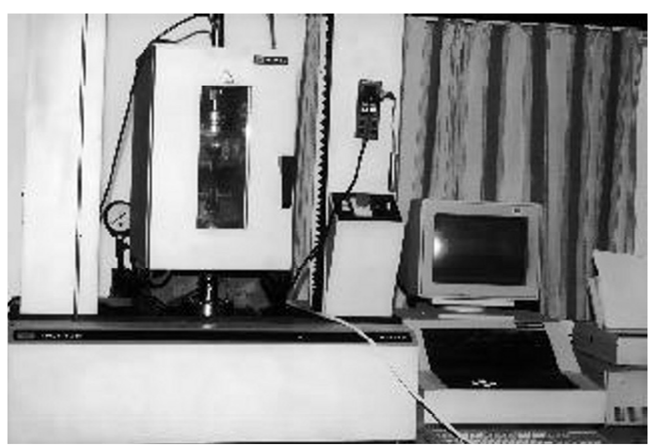

Fig. 5 :