

had two reference points, points A and B. The distance between these two points was 20.11 mm. The ring block was a cylinder of an inner diameter of 30 mm and a depth of 2 mm thickness.

Selection and Manipulation of Materials

Five commonly used interocclusal recording materials were selected for the purpose of this study. All the materials were purchased from local market through regular commercial channels. The distance between the reference points A and B reproduced on the samples of wax (Fig. 2), zinc oxide eugenol impression paste, (Fig. 3), polyether (Fig. 4), polyvinyl siloxane (Fig. 5), bisacryl (Fig. 6), and bite registration material was measured by using a stereomicroscope. Readings were obtained for each sample at different time intervals post disinfection, i.e., 10 and 60 minutes after removal from the die.

The materials used for this study were divided into five groups as:

- Group A: Aluwax (Maarc).
- Group B: zinc oxide eugenol impression paste (DPI).
- Group C: polyether bite registration material (3M ESPE, Germany).
- Group D: polyvinyl siloxane bite registration material (DMG, Germany).
- Group E: bisacryl bite registration material (DMG, Germany).

These 50 samples were subdivided into 5 subgroups, consisting of 10 samples each. All the samples (except the control group) were subjected to disinfection.



Fig. 1: Stainless steel die

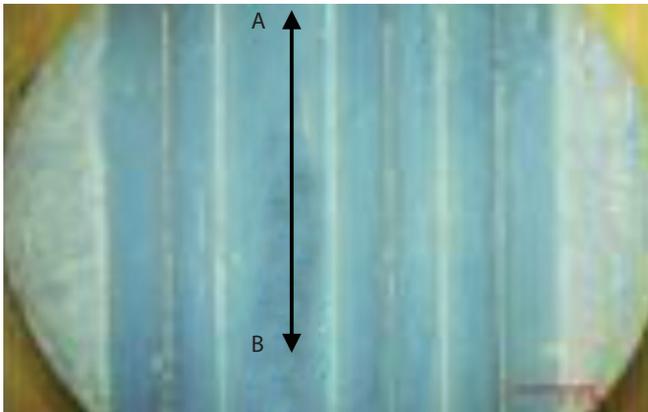


Fig. 2: The distance between reference points A and B reproduced on the samples of wax when viewed under the stereomicroscope

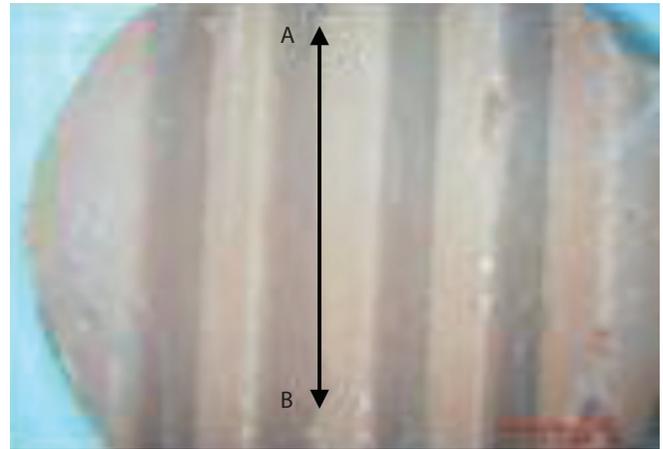


Fig. 3: The distance between reference points A and B reproduced on the samples of zinc oxide eugenol paste when viewed under the stereomicroscope

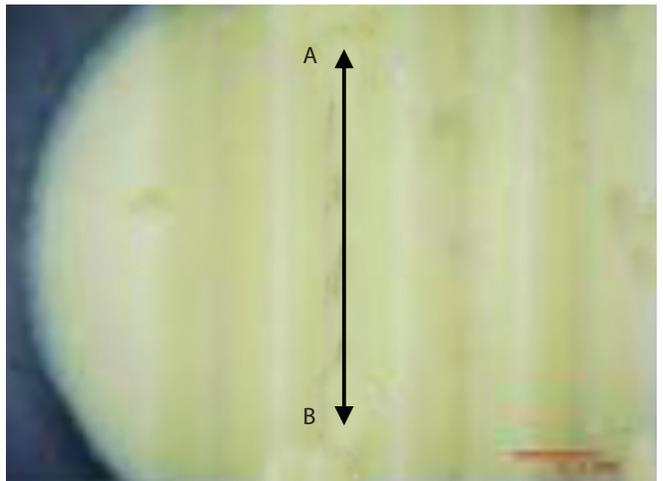


Fig. 4: The distance between reference points A and B reproduced on the samples of polyether when viewed under the stereomicroscope

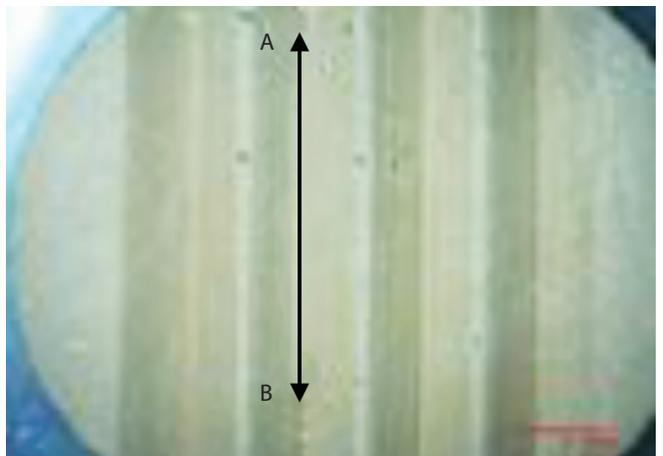


Fig. 5: The distance between reference points A and B reproduced on the samples of polyvinyl siloxane when viewed under the stereomicroscope

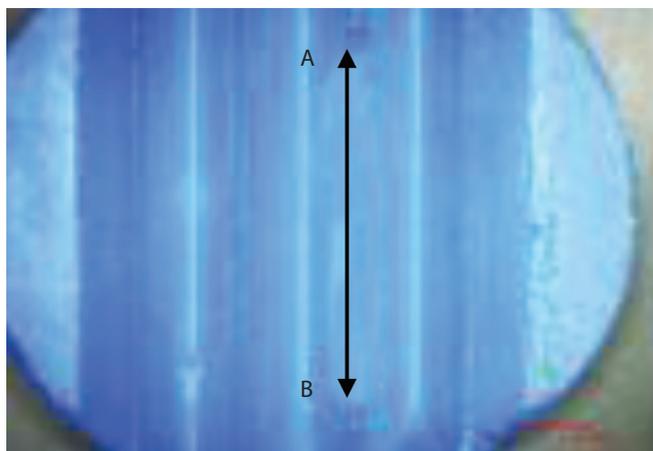


Fig. 6: The distance between reference points A and B reproduced on the samples of bisacryl when viewed under the stereomicroscope

The samples were subgrouped and immersed in glutaraldehyde and sodium hypochlorite for time intervals of 10 and 60 minutes into beakers. They were subgrouped as follows:

- Subgroup I: (control group): no disinfection.
- Subgroup II: immersion in 2% glutaraldehyde for 10 minutes.
- Subgroup III: immersion in 2% glutaraldehyde for 60 minutes.
- Subgroup IV: immersion in 5% sodium hypochlorite for 10 minutes.
- Subgroup V: immersion in 5% sodium hypochlorite for 60 minutes.

Manipulation of Wax Bite Registration Material (Aluwax)

Wax was manipulated by breaking it and putting it into a syringe before melting. A 5 mL syringe was submerged into a 45 °C water bath for 5 min. After homogenous mixing, the material was injected into the mold.

Manipulation of Zinc Oxide Eugenol and Polyether Bite Registration Material

The required amounts of equal lengths of base paste and catalyst paste were dispensed on the mixing pad provided by

the manufacturer. These two pastes were mixed together with a stainless steel mixing spatula for 30 seconds to get a homogenous streak-free mix. The material was then spread on the surface of the stainless steel die by taking precautions not to incorporate any air bubbles.

Manipulation of Polyvinyl Siloxane and Bisacrylic Bite Registration Material

The polyvinyl siloxane bite registration was supplied in the form of a cartridge-containing base paste and accelerator paste. The cartridge along with a mixing tip was attached to an automixing dispensing gun. The material that expelled from the dispensing tip was uniformly spread over the surface of the stainless steel die by taking precautions not to incorporate any air bubbles.

Preparation of Samples

Each material was manipulated according to the manufacturer’s instructions and dispensed on the die as mentioned above. After dispensing on the stainless steel die, a glass plate covered with a polyethylene sheet was placed on the stainless steel die over which a weight of 500 g was kept and the material was allowed to set for 5 minutes. Thus, a total force of 5.56 N (the weight of the glass plate is 67 g + external weight of 500 g) was applied. This was the average pressure required to compensate the initial resistance of the interocclusal material, which may vary between 0.5 N and 13.8 N. Each sample was separated from the die after 5 minutes. All the excess material (Flash) was trimmed by using a Bard Parker blade. The prepared specimens were measuring 30 mm in diameter and 2 mm in thickness. The materials were allowed to set for the manufacturer’s suggested setting time plus an additional 3 minutes to ensure polymerization of the materials. Fifty samples were made from each group (a total of 250 samples from 5 groups).

RESULTS

The distance between the reference points A and B reproduced on all the 250 samples of bite registration material was measured by using the stereomicroscope. Readings were obtained for each

Table 1: The comparison of the distance between reference points reproduced on the samples within the subgroups of wax interocclusal recording material using the ANOVA test

Groups	Mean	Standard deviation	95% confidence interval for mean		F	p
			Lower	Upper		
Subgroup 1	20.2780	0.00422	20.2750	20.2810	258.372	0.000 (HS)
Subgroup 2	20.2810	0.00738	20.2757	20.2863		
Subgroup 3	20.2380	0.00422	20.2350	20.2410		
Subgroup 4	20.2280	0.00422	20.2250	20.2310		
Subgroup 5	20.2780	0.00422	20.2750	20.2810		

Table 2: The comparison of the distance between reference points reproduced on the samples within the subgroups of zinc oxide eugenol paste interocclusal recording material using the ANOVA test

Groups	Mean	Standard deviation	95% confidence interval for mean		F	p
			Lower	Upper		
Subgroup 1	20.2280	0.00422	20.2250	20.2310	1511.495	0.000 (HS)
Subgroup 2	20.3680	0.00422	20.3650	20.3710		
Subgroup 3	20.2270	0.00483	20.2235	20.2305		
Subgroup 4	20.2760	0.00516	20.2723	20.2797		
Subgroup 5	20.2770	0.00483	20.2735	20.2805		

Table 3: The comparison of the distance between reference points reproduced on the samples within the subgroups of polyether interocclusal recording material using the ANOVA test

Groups	Mean	Standard deviation	95% confidence interval for mean		F	p
			Lower	Upper		
Subgroup 1	20.1870	0.00483	20.1835	20.1905	9064.716	0.000 (HS)
Subgroup 2	20.2280	0.00422	20.2250	20.2310		
Subgroup 3	20.5570	0.00483	20.5535	20.5605		
Subgroup 4	20.3260	0.00699	20.3210	20.3310		
Subgroup 5	20.1980	0.00422	20.1950	20.2010		

Table 4: The comparison of the distance between reference points reproduced on the samples within the subgroups of polyvinyl siloxane interocclusal recording material using the ANOVA test

Groups	Mean	Standard deviation	95% confidence interval for mean		F	p
			Lower	Upper		
Subgroup 1	20.1770	0.00483	20.1735	20.1805	12623.826	0.000 (HS)
Subgroup 2	20.2780	0.00422	20.2750	20.2810		
Subgroup 3	20.6070	0.00483	20.6035	20.6105		
Subgroup 4	20.2780	0.00422	20.2750	20.2810		
Subgroup 5	20.2970	0.00483	20.2935	20.3005		

Table 5: The comparison of the distance between reference points reproduced on the samples within the subgroups of bisacryl interocclusal recording material using the ANOVA test

Groups	Mean	Standard deviation	95% confidence interval for mean		F	p
			Lower	Upper		
Subgroup 1	20.2790	0.00316	20.2767	20.2813	1.144	0.348 (NS)
Subgroup 2	20.2810	0.00316	20.2787	20.2833		
Subgroup 3	20.2790	0.00316	20.2767	20.2813		
Subgroup 4	20.2780	0.00422	20.2750	20.2810		
Subgroup 5	20.2780	0.00422	20.2750	20.2810		

sample at different time intervals post disinfection, i.e., 10 and 60 minutes after removal from the die. All the readings thus obtained were tabulated (Tables 1 to 5) and subjected to statistical analysis for the comparison of linear dimensional changes of all five interocclusal recording materials.

Interpretation of Tables

Materials evaluated and compared in the present study were Aluwax (Maarc), zinc oxide eugenol paste (DPI), polyether (Ramitec), polyvinyl siloxane (O Bite), and bisacrylic bite registration material (Luxabite). Comparison of five groups (Tables 1 to 4) by the immersion technique for 10 and 60 minutes in both 2% glutaraldehyde and 5% sodium hypochlorite showed a highly significant difference in the mean values between the groups and subgroups when immersed for 10 and 60 minutes except for the bisacryl interocclusal recording material (Table 5) by the analysis of variance (ANOVA) test. The bisacryl interocclusal recording material showed no significant difference upon immersion in both solutions at both time intervals.

Contraction in the form of shrinkage occurs at 0.25% when immersed in sodium hypochlorite for 10 minutes. Contraction occurs at 0.2% when immersed in 2% glutaraldehyde for 60 minutes and expansion occurs at 0.02% when immersed for 10 minutes. Wax showed no linear dimensional changes after immersion in 2% glutaraldehyde solution for 60 minutes. It showed the maximum linear dimensional changes after using 2% glutaraldehyde when used as a disinfectant after immersion for 10 minutes. ZOE showed no linear dimensional changes after using 2% glutaraldehyde and 5% sodium hypochlorite as disinfectants after immersion for

60 minutes. Polyether showed the minimum linear dimensional change when using 5% sodium hypochlorite as a disinfectant after immersion for 60 minutes. The maximum dimensional change was observed after immersion for 60 minutes in 2% glutaraldehyde. Polyvinyl siloxane showed the maximum linear dimensional changes after immersion in 2% glutaraldehyde solution and minimum changes when immersed in 5% sodium hypochlorite both for 60 minutes. Bisacryl showed no linear dimensional changes when immersed in both solutions for the same time intervals. The result of this present study is in accordance with the finding of Gounder R who compared and measured the accuracy of Aluwax, polyvinyl siloxane, and polyether interocclusal recording materials with disinfection using 0.5% chlorhexidine gluconate, 1% sodium hypochlorite, and 2% glutaraldehyde using immersion and spray atomization techniques for 30 and 60 minutes, which are being clinically acceptable.

DISCUSSION

Interocclusal recording materials are used to transfer the interocclusal relationship from a patient’s mouth to the lab.⁴ During the restorative phase of any dental treatment, good interocclusal record and the precise articulation of patient’s diagnostic or working casts are a prerequisite for the fabrication of clinically acceptable prosthesis. Apart from the operator’s clinical ability and the technique followed, the chosen material can affect the accuracy of interocclusal registration and, thereby, the final outcome of the restoration. Bite registration record acts as a significant source form

A possible limitation of this study is that it takes only the linear measurement as a parameter for determining dimensional stability as in routine clinical situations, while dimensional errors occur in all three dimensions. The conditions during interocclusal record making differed from the natural oral environment.

CONCLUSIONS

Within the limitation of this study, the following conclusions can be drawn: Ramitec (polyether) showed minimum dimensional stability after immersion in 2% glutaraldehyde solution for 60 minutes. Zinc oxide eugenol showed the maximum dimensional stability when immersed in 2% glutaraldehyde and 5% sodium hypochlorite for 60 minutes. Aluwax showed the maximum dimensional stability when immersed in 5% sodium hypochlorite for 60 minutes. O-Bite (polyvinyl siloxane) shows the maximum dimensional stability when immersed in 2% glutaraldehyde and 5% sodium hypochlorite for 10 minutes. An increase in immersion time increases the changes of dimensional inaccuracy.

CLINICAL SIGNIFICANCE

Prevention of cross-contamination between patients, dentists, auxiliary persons, and technicians when handling interocclusal recording media without hampering the treatment is the outcome to obtain a successful treatment.

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