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The Effect of Rewash on Putty-Wash Impression Technique in Fixed Prosthodontics

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Abstract: In the two-step putty wash impression technique after providing first impression, sometimes there are defects in the impression that can be corrected by rewash (reline), although there are different opinions regarding this technique. This study was performed by experimental method on laboratory model. In addition to ten impressions from a laboratory model with routine putty-wash technique (single wash) as control group, another ten impressions were taken with rewash (double wash) technique for evaluation. Then die stones were poured and 20 stone models were provided. Different dimensions of all stone models were compared with lab model and the results were analyzed by t - test. The height of die in the rewash impression technique comparing with control group decreased but its p-value was not statistically significant. Meanwhile, in the rewash technique, there was a significant decrease in die diameter and the distance between two dies increased due to shrinkage. Rewash impression technique leads to reduction in die diameter. When, there is an undercut below finishing line, die diameter significantly decrease in rewash technique. Rewash technique is debatable because of reduction in tooth diameter, so it is not advisable.

Key words: Rewash, reline, wash, impression, putty

INTRODUCTION

In two-step putty wash impression technique, first impression is provided by putty and then final impression is taken by wash material. Sometimes after final impression, minor defects are seen, which can be corrected by overall rewash (reline).

This technique is used when defects remaine after first putty-wash impression any defect is seen. The useless undercuts and interproximal impression walls are eliminated so that impression could sit easily in its place. After these stages, an overall rewash impression could be taken.

It seems that this method will provide an impression which is clinically desirable and also records the details, but its accuracy should be evaluated by investigation.

The advantages of rewash impression technique are as follow (Calomeni and Colenel, 1971):

- Better recording of details.
- Lesser chair time.
- Reducing chair time lesser amounts of impression material.
- Free of or less bubbles in the impression.
- No need for gingival retraction.
- No specific equipment is needed.
- Uniform surface in final impression.

Bombery and Hatch (1984) corrected minor defects in the impression locally but according to evaluation of marginal opening, they concluded that these impressions do not have enough accuracy. They claimed impressions should be taken once more or an overall rewash impression should be taken.

As other study (Gullett and Podshadley, 1979) mentioned correcting the impression defects saves 46% (7.6 min) of dentists and patient's time, also 62% (22.22 gr) of the impression material.

Skinner and Cooper (1995) evaluated reline technique on mercaptan as an impression material. Their results showed that the pressure on the impression material when it is being relined may cause deformity in primary impression because of compressive forces and after eliminating that forces and removing impression from the patient's mouth those forces are released. Extra pressures may cause reduction in die size. The findings of their study also showed that creating escape vents in the primary impression material can prevent this deformity however there is the danger of impression distortion. What so ever this method is not recommended normally.

Podshaley *et al.* (1970) who evaluated relining the mercaptan impression material understood that despite of decrease in die size because of the relining method, the stone expansion compensated the size reduction which would be near to the original model.

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Because of different opinions and contradictions and lack of investigations on putty wash impression material, a comprehensive study on the rewash impression technique accuracy is prominent and necessary.

- Impression material and die stone.
- Method of impression taking.
- Number of samples.
- Method of measurement.
- Evaluation of dimensions.
- Statistical methods.

Laboratory model had two parts, upper and lower. Lower part contained two metal dies and guiding rods which facilitated unified path of insertion of the impression tray. One of the dies was suggested as premolar and the bigger one as a molar tooth, both with 3 degree convergency in the walls were round cross sectionally. The larger dies had V-shape groove as an undercut. Special tray stood in the upper part of the laboratory model (Fig. 1).

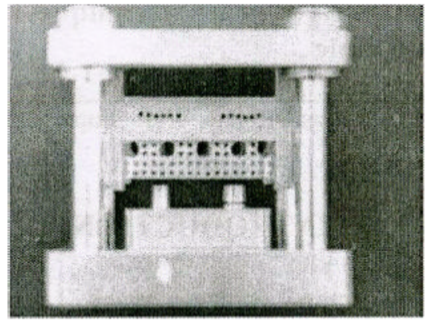

Fig. 1: Lab model

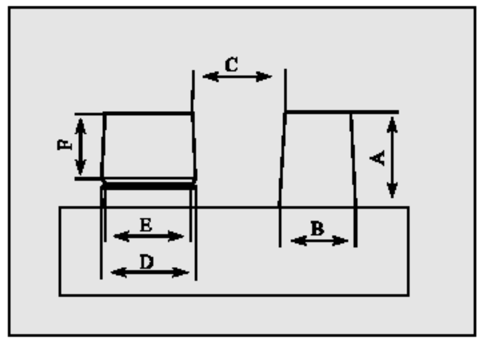

Fig. 2: Height of die without undercut (A), Die diameter without undercut (B), Distance between two die from each other (C), Die diameter below the undercut (D), Inside diameter of undercut (E), Height of above the undercut (F)

MATERIALS AND METHODS

Stone samples were provided by putty impression technique with one stage wash in control group and with two stage wash (reline) in experimental group which all were poured with die stone and casts were prepared. Dimensions of casts were measured and two groups were compared with original model. The study was conducted in vitro and the method was quasi-experimental.

Laboratory model: The impression material was putty wash president (Coltene, Altstatten, Switzerland) which is additional silicone and because of their preference to other condensation silicones, has been used in different investigations (Stannard and Nouri, 1986; Schelb *et al*., 1987; Drennon *et al*., 1989; Cieso *et al*., 1981; Sandrik and Vacco, 1983). The amount of material used was 4 measure units and also 12cm wash material which were used according to manufacturers recommendation. The used stone was vel-mix (Kerr Mfg. Co: USA). There was good compatibility between vel-mix and president impression material (Schelb *et al*., 1987).

After 30 min impressions were poured by vel-mix stone according to the following method.

Fourty eight gram stone was mixed with 12 mL water (which was 23°warm). Stone was poured into water gradually in 10 sec and then the operator waited 30 sec in order to let the stone absorb the water. In order to reducing the number of bubble and better mixing, vacuum mixer machine which was used for 30 sec and set on 80 (Morford *et al*., 1986; Schrabeck *et al*., 1986). Then the prepared stone was poured into impression in 3 min with a light vibration. After one hour of setting time, cast was removed from the impression (according to manufacture's instruction).

Control group impression technique: Since, a suitable space for impression wash material is 2 mm' (Marsb *et al*., 1990) so a metal spacer was made to prepare such a space. In the first stage, spacer was placed over the die and putty impression was taken. In second stage spacer was removed and wash impression material was used.

Rewash impression technique: In this technique, in addition to first putty and wash impression, another overall wash impression was taken.

Ten impressions were taken with each technique which totally provided 20 stone models.

The samples were numbered randomly and their dimensions were evaluated by profile projector (Nikon, Model 6c, Tokyo, Japan) with 0.001 mm accuracy. This device has been used in other investigation (Johnson *et al*., 1988).

Table 1: Measures of dimensions of stone model

Impression techniques	Dimensions	A	B	C	D	E	F
With space	Lab models	0.005	8.056	21.722	10.046	7.98	7.090
	Mean	9.719	8.120	21.760	10.160	8.027	7.170
	a	-.79%	0.79%	0.18%	1.14%	0.58%	1.13%
	SD	0.043	0.019	0.05	0.056	0.015	0.03
Without space	Mean	0.680	7.996	21.891	10.029	7.870	7.099
	a	-3.15%	-0.75%	0.78%	-1.17%	-1.39%	0.13%
	SD	0.040	0.046	0.041	0.065	0.043	0.025

Percentage of deviation was calculated by [D of main model-D of stone sample]/[D of main model] ×100 (D = Dimension)

Six places were measured on lab model and stone samples (Fig. 2). "A" and "B" were height and diameter of the die without any undercut, which were measured in order to demonstrate impression accuracy. By measuring "C" the distance between two dies the impression accuracy for bridge is shown. "D", "E" and "F" were the diameters of below and inside of the undercut and height above the undercut, which were used in order to measure the dimensional changes of impression material around the undercut.

Lab model 6 times and stone dies 3 times were measured in order to obtain a better reading of diameter, then the average of readings were calculated.

The average dimensions of dies on laboratory model and stone model and percentage of deviation was calculated (Table 1). Then t-test was performed on the results.

RESULTS AND DISCUSSION

Lab model and stone models dimensions were measured. Then their average, percentage of deviation and standard deviation were calculated (Table 1). Finally t-test was performed on them.

Height of a die without undercut (A): In both techniques height decreased but in rewash impression technique reduction was greater in amount (Fig. 3). According to t-test the difference was not significant.

Diameter of a die without undercut (B): In control group die diameter increased and in rewash technique die diameter decreased (Fig. 3) and the differences were significant (PO.001).

Distance between dies (C): Control impression technique had less dimensional changes but in rewash impression technique distance between two dies increased (Fig. 3) that was because of reduction in die diameter. According to t-test, the differences in these two techniques were significant (PO.001).

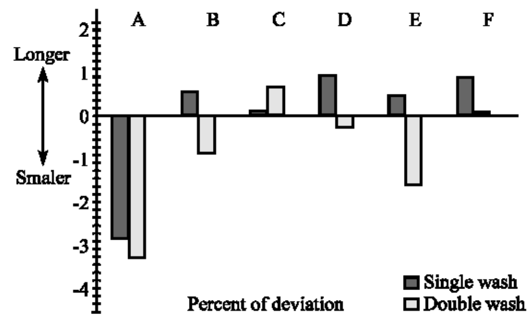

Fig. 3: Percent of deviation

Die diameter below undercut region (D): Die diameter below undercut region in control group increased and in rewash impression technique decreased (Fig. 3). T-test showed significant differences (PO.001).

Diameter of inside of the undercut (E): In control group "E" increased and in rewash impression technique decreased (Fig. 3). T-test showed significant differences (PO.001).

Height above the undercut (F): In both techniques height increased but in rewash impression technique changes were comparatively less than the original model (Fig. 3). T-test showed significant difference (PO.001).

While, evaluating dimensions of A, B, and C, it was observed that the height of die in rewash impression technique in relation to control group had decreased but the P-value was not significant statistically.

Moreover, in rewash technique there is a significant reduction in die diameter. Also, distance between two dies increases because of shrinkage due to elastic recovery. So, in the second step of rewash technique, putty and first wash are under pressure in addition to the second wash, therefore on removal of the tray from the mouth pressures are released and shrinkage takes place.

Skinner and Cooper (1955) in their study "Desirable properties and use of rubber impression materials" demonstrated that relining reduces die diameter and prevents complete sitting of restoration. In spite of different study method, lab model and type of impression material, the results are similar to the present study.

Podshadley and Co-worker (1970) in their study under the title of "Accuracy of relined mercaptan rubber impression" showed that in the use of regular consistency of impression material, relining decreases die diameter but its diameter in relation to control impression technique is more similar to original model. The results are different from this study. Their impression material was mercaptan which is much different from wash and putty. Since, in rewash impression technique, die diameter is decreased and distance between supportive tooth is increased, the use of this technique is questionable.

By evaluating D, E and F, the effect of undercut on rewash impression technique accuracy is demonstrated by comparing with the control group. In rewash impression technique die diameter with undercut significantly decreases, especially below undercut region, which is probably because of shrinkage due to elastic recovery of the first wash impression.

The height above the undercut region in rewash impression technique in relation to control group showed less changes and its diameter was more similar to original model which is because of the shrinkage in different directions neutralizing each other.

Unfortunately there is no research about the effect of undercut in rewash impression technique. Therefore, when there is undercut below finishing line in the rewash impression technique, the die diameter significantly decreases. As a result this technique is questionable.

CONCLUSION

The differences of die height in both rewash impression technique and the control group was not significant statistically.

Rewash impression technique decreases the die diameter.

Rewash impression technique increases the distance between dies.

When, there is an undercut below finishing line, in rewash impression technique, die diameter decreases significantly. The use of rewash impression technique is debatable and it is not recommended because of reducing the diameters.

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