

IMPRESSION FAULTS USING IRREVERSIBLE HYDROCOLLOID IMPRESSION MATERIAL BY UNDERGRADUATE AND GRADUATE STUDENTS

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ABSTRACT

The aim of this study was to evaluate faults in impression taken by undergraduate and graduate student's using Irreversible Hydrocolloid impression material. Descriptive study was carried out at Prosthodontics Department of Liaquat University of Medical and Health Sciences Jamshoro from January 2017 to December 2017. Total three hundred impressions of patients were taken by undergraduate and graduate students. Recorded Impressions were evaluated by one operator to check faults that were recorded in structured Proforma.

Most common error found in 300 impressions taken by undergraduates and graduate students in descending orders were air bubbles (59%), inadequate sulcus record (53%), tearing of impression material from tray (40%), improper mixing of material leading to incorporation of unmixed dry material (36%), presence of voids (35%), inadequate distal surface records (30%), improper palatal records (29%), under extended record (27%), improper occlusal thickness (27%), improper tray selection leading to rotated impression (17%) and separation of material from tray (15%) respectively. The relationship of faults of impressions with graduates and undergraduates was statistically non-significant. Impression is success for any prosthesis. Suitable impressions from alginate material can be made by appropriate or skillful techniques.

Key Words: *Alginate Impression material, Irreversible hydrocolloid, Impression faults.*

INTRODUCTION

An impression is usually a record, negative replica of the oral tissues taken at an unrestrained rest position. In dentistry the use of dimensionally stable impression materials and the development of accurate impressions are the first and foremost step towards the fabrication of a successful and well fitted prosthesis.¹ Proper impressions are required for recording oral structures and making the prosthesis.²

There are many materials used for recording impressions. these include reversible hydrocolloid this includes agar impression material, irreversible hydrocolloid this includes alginate impression material, modelling plas-

tic impressions these includes impression compounds, plaster impression material, wax impression material, silicone based impression materials, polysulfide impression materials and polyether impression materials.³

Alginate impressions are usually used for making working casts and diagnostic casts. Patients can accept the alginate material easily and is of low cost.³ Alginate was originally developed in the 1930s. In 1978 an alginate mixing device became available.⁴ Alginate impression material is an elastic, irreversible hydrocolloid impression material. It is available in different forms like powder and pastes. Powder is mixed with water and pastes are mixed together. Alginate impression material possess the qualities of good surface detail and show errors also like tear over deep undercuts, unstable in the presence of moisture, less accurate reproduction of details.⁵ It has dimensional changes as a result of syneresis or evaporation of water when exposed to air and imbibition or gaining of water when exposed to moisture.

There are six keys of success in obtaining an impression with alginate material. These are tray selection, choosing the correct quantity of material, proper mixing the material and proper loading of impression material,

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insertion of loaded tray in to mouth, seating of tray in proper position and removal of tray from mouth.⁶ If these steps are not followed properly, impression faults developed. Impression faults includes tearing of impression material, inadequate recording of oral structures, presence of air bubbles and voids⁷.

The aim of this study was to evaluate the errors in alginate impressions taken by under-graduate and graduate students, to find out the causes of development of these errors, and to find solutions to overcome these impression faults.

METHODOLOGY

This cross sectional study was conducted in the Department of Prosthodontics, Liaquat University of Medical and Health Sciences Jamshoro from January 2017 to December 2017. In this study 150 impressions of patients were recorded by under graduate students (students of third and final professional BDS) and 150 impressions of patients were taken by graduates (House officers and Post graduate trainees) using convenience non probability sampling technique. Alginate impressions recorded by under graduates and graduates of maxillary arches were checked under good light source by single operator. Faults were noted in structured Proforma. The generated Data were compiled and analyzed using SPSS version 21. The descriptive statistics was calculated as frequency and percentage. The chi square test was applied to verify the statistical significance.

RESULTS

In this study 300 alginate impressions of maxillary arches of patients were recorded. After recording impressions faults were noted. Faults observed were air bubbles, tearing of material, inadequate sulcus depth, material not properly extended, improper mixing of material, improper palatal records, inadequate distal records, occlusal thickness not properly recorded, improper tray selection, material separation from tray and presence of voids.

In the present study tearing of alginate impressions was found in 40% of impressions. Inadequate depth of sulcus records using an alginate impression material was found in 53%. Impression material not properly extended beyond the tray to record complete surface area was found in 27% of impressions. Improper mixing of material leading to incorporation of unmixed dry material in alginate impression was noted in 36%. Improper recording of palatal surface area was observed in 29% of impressions. In this study highest percentage of air bubbles were noted while using the alginate impression materials by both groups of students about 59%. Inadequate distal record (material not fully extended distally) was found in 30% of impressions. Occlusal thickness not properly recorded in alginate impression

material was found in 27%. Improper tray selection leading to rotated impression was noted in 17%. Voids present in alginate impression material were found in 35% of impressions. Details of each faults are shown in Table 1.

DISCUSSION

In this study 300 alginate impressions were recorded and those were checked under good light source by single operator, many errors observed that were noted. Many studies have been reported on alginate impression materials⁷⁻⁸. Some errors in impression were identified by Robert W. Rudd⁷ in his study solutions of errors were described using a proper mix of irreversible hydrocolloid impression material. Williams and Watkins⁸ also examined the properties of alginate.

In our study tearing of impression material was noted in 40% of impressions out of 300 impressions as shown in table, while other studies show increased percentage of alginate impression tear.⁹ when the impression is removed from the mouth quickly it will tear easily due to inadequate strength. Inadequate sulcus depth records using an alginate impression material was found in 53% of impressions in our study. In other study done by W.Robert et al⁷ shows the same results. If the impression tray used is too small, tray borders may impinge and distortion of soft tissues occurs while the proper size of tray will provide enough space for the impression material and enough room for alginate to record an imprint the tray should be long enough to captured the tissues,

Impression material not properly extended beyond the tray to record complete surface area was found in 27% of impressions recorded by both undergraduate and graduate students. when irreversible hydrocolloid material is thicker mixed and loaded tray insert and seated in the mouth, material may not flow into the interdental spaces properly and cannot obtained the tissue record.

Improper mixing of material leading to incorporation of unmixed dry material in alginate impression was noted in 36%% of impressions shown in Table. Rubell BS² in his study pointed out that during mixing of alginate with adding water to the powder results in unmixed irreversible hydrocolloid material and cause improper impression.

Therefore, at all times add alginate powder to the water to mix systematically for best results. Improper recording of palatal surface area were observed in impression when using alginate impression material was 29% shown in Table. When the loaded oversized tray is used it becomes difficult to record tissues of palate and ascending ramus of mandible.

TABLE 1: FAULTS PRESENT IN IMPRESSIONS TAKEN WITH IRREVERSIBLE HYDROCOLLOID MATERIAL DISJOINTEDLY BY GRADUATE AND UNDERGRADUATE STUDENTS.

Errors in Alginate Impression Material	Graduate Frequency Percentage	Undergraduat Frequency Percentage	Total	P-Value
Tearing Of Impression Material	58 38.7%	61 40.7%	119 39.7%	0.723
Inadequate Sulcus Record	78 52.0%	81 54.0%	159 53%	0.729
Under Extended Record	39 26.0%	42 28.0%	81 27%	0.696
Improper Mixing Of Material	49 32.7%	58 38.7%	107 35.7%	0.728
Improper Palatal Record	40 26.7%	46 30.7%	86 28.7%	0.444
Presence Of Air Bubbles	88 58.7%	90 60.0%	178 59.3%	0.814
Inadequate Distal Surface Records	41 27.3%	48 32.0%	89 29.7%	0.376
Occlusal Thickness Not Properly Recorded	43 28.7%	38 25.3%	81 27%	0.516
Improper Tray Selection	26 17.3%	24 16.0%	50 16.7%	0.757
Material Separated From Tray	24 16.0%	22 14.7%	46 15.3%	0.749
Voids Present	58 38.7%	46 30.7%	104 34.7%	0.145

In this study highest percentage 59.3% of air bubbles were recorded while using the alginate impression materials by both groups of students. Improperly spatulated material results in air bubbles and also inaccurate measurements of alginate powder/water ratio. While manual mixing using a bowl and spatula, the potential for air entrapment is great and in order to minimize air bubble add powder and water in particular sequence, in addition automated alginate mixing system speed up the mixing process while reducing the incorporation of air bubble¹⁰⁻¹¹. If the cold water is used it increase setting time and hot water reduce the setting time .so the ideal water temperature should be of room temperature. Mixing of alginate with spatula against the sides of rubber bowl to avoid to create the air bubbles with certain spatulation time. Do not over mix, never pump the alginate up and down, stir it in circular fashion and tap the sides of the mixing bowl. In order to evade bubbles mix a small quantity and make a thin mixture (thick mixture is likely to trap air) and impression should be poured immediately.

Inadequate distal record (material not fully extended distally) was found in 30% of impressions taken by graduates and undergraduates as shown in Table. Occlusal thickness not properly recorded in alginate impression material was found in 27% of impressions taken by graduates and undergraduates as shown in Table. For proper occlusal thickness approximately 5mm of the material should be there between all the teeth and sides of the tray. Improper tray selection leading to rotated impression was found in 17% of impressions. As the selection of the tray is essential

for dental arch, modification with wax, tracing stick, impression compound or heavy bodied silicone can be done. For proper placement of tray, tray should not be over seated which would result in coverage of areas of the impression in tray. Tray can be placed firmly in order to avoid any movement.

Voids present in alginate impression material were found in 35% of impressions taken by graduates and undergraduates shown in Table. The tray must be filled up with desirable amount of material and an extra material at the borders should be removed with the spatula. Uncorroborated material would deform because of the weight of impression which acts directly on an extra material and this happens in distal areas of upper and lower impressions that will lead to deformation of cast anterioposteriorly.

If alginate material mixed in thin consistency it would be hard to handle and escape from the tray which cause the voids formation in impression of irreversible hydrocolloid is difficult to control in the impression tray and may flow out from the tray and cause voids in the impression, thus results inaccurate production of the anatomy of soft tissues. Least error found in our study was separation of material from tray was recorded while using the alginate impression materials by both groups of students. When alginate loaded in bare tray, material would not uniformly stick while sets results in separation from tray.

CONCLUSION

In this study highest percentage of faults were pres-

ence of air bubbles while using the alginate impression materials by both groups of students and least error this was separation of material from impression tray.

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CONTRIBUTIONS BY AUTHORS

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5 Abdul Ghani Shaikh: Data Collection.