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Evaluation of Type of Impression Technique Used in Tooth Supported Full Mouth Rehabilitation - A Retrospective Study

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Abstract: The aim of this study was to retrospectively evaluate the type of impression technique used by various dental students. A total of 98 data entries were taken, duplicate and missing entries were omitted. So a total of 63 entries were evaluated. The data was collected from patient records in Saveetha Dental College, over a period of one year. . The evaluation was based on the type of impression technique used by various dental students. The results of the study were subjected to statistical analysis. Data analysis was done using SPSS software version 23.0. Chi-square test and frequency evaluation was done to evaluate the most frequently used impression technique in FMR. It was found that more than 92% of dental students preferred to use double stage putty wash technique with a (*P*-value - .743) The present study concluded that most of the dental students preferred to use double stage putty wash impression technique for their dental treatment

Keywords: Arch; Full Mouth Rehabilitation; Innovation technique, Types of impression material; Tooth Supported FMR; Two stage putty wash, innovation

INTRODUCTION

The accuracy of dental impression taking is one of the major factors influencing the fit of the crowns and longevity of the fixed partial denture.The quality of the dental restorations is mainly influenced by the accuracy of the impression(Balkenhol *et al.*, 2005). It also aids in good health of the surrounding tissues(Felton *et al.*, 1991). The process includes careful transfer of the patient's soft and hard tissues to the laboratory and is a major part of the successful treatment.Having anatomical knowledge about periodontal tissues, making an accurate impression, materials and an appropriate technique are important in making a suitable and accurate impression.(Ghaznavi, 2016).

The impression technique determines the restoration of the finish line. Necessity of applying an accurate impression technique is because of the significance of margin in longevity of restoration and on marginal adaptation of restoration. When restoration with suitable marginal adaptation and minimum gap is obtained the accuracy of impression technique is revealed . “Effect of the second wash on marginal adaptation in one and two-step impression technique,” (Pande and Parkhedkar, 2012)

Inaccurate margin fit causes plaque accumulation, microleakage and cement breakdown.subsequently: the risk of carious lesions, periodontal diseases, endodontic inflammation and adverse consequences that affect the underlying health of abutments.(Felton *et al.*, 1991),(Jacobs and Stewart Windeler, 1991), (Sorensen, 1990).Clinically unacceptable internal and marginal fit of the restoration caused by imprecise impressions could; in most cases be corrected only by repeating the impression and the laboratory work

Several studies have evaluated the maximal marginal gap values. (McLean, 1972), (Hung *et al.*, 1990), (Reich *et al.*, 2008) Mc lean concluded a marginal gap of less than 120 microns is clinically acceptable. Apart from the impression technique; various factors including finish line configuration, type of die used, type of sprue, dye spacer, type of alloy, casting method and the type of impression material. influences the marginal adaptation.(Reich *et al.*, 2008; Jalalian and Aletaha, 2011) Rubber-based elastomers are widely used in fixed prosthodontics and are highly accurate. (Saunders *et al.*, 1991).Rubber base impressions reported to be most stable when an even thickness of 2-4 mm is present within the tray(Reisbick and Matyas, 1975) ,Common impression materials include hydrocolloid and elastomeric impression materials(Tjan *et al.*, 1986). In Europe, condensation-curing silicone, addition- curing silicone also known as polyvinyl siloxane, and polyether are the

prevailing impression ma- terials.(Quaas, Rudolph and Luthardt, 2007). PVS is popular because of its excellent elastic recovery, optimal accuracy, dimensional stability, adequate tear resistance, ease of use, and lack of unpleasant taste or smell.(Habib and Shehata, 1995; Quaas, Rudolph and Luthardt, 2007),(Mandikos, 1998). Temperature has a great influence on the working time of additional silicone and the hardened material has lower rigidity than polyether. Among the impression materials; polyvinyl siloxane is widely used. It is one of the most accurate and stable impression materials. It is used as single paste, double paste and putty wash systems.currently putty wash is extensively used. (Land and Fujimoto, 1995) . PVS shows a superior dimensional stability over time.(Thongthammachat *et al.*, 2002).

Various impression techniques include - stage putty wash (two materials with different viscosities), stage putty wash (two materials with different viscosities) and Monophase impression (one material).

It has been shown that a stock tray is acceptable when a heavy body-wash technique is used (Myers and Stockman, 1960), (Tjan *et al*., 1986) .Myers and Tjan considered that although a custom tray was not necessary for use with the putty wash system proper spacing of the tray and suitable rigidity was required for adequate accuracy. Burton et al. confirmed that a rigid tray was required for accurate impressions. Recent advances in impression making includes; Digital impression technique; it has been advertised as an alternative to conventional impression making. As it saves a lot of work and material and any repetition can also be easily done. Some of the Intra oral scanners like - i Tero, TRIOS, CEREC AC, PLANSCAN and TRUE DEFINITION are commonly used in many of the practitioners.

Many studies which involved case reports (Ashok *et al.*, 2014) , surveys (Ashok and Suvitha, 2016) ,systematic reviews (Ganapathy, Kannan and Venugopalan, 2017), (Ganapathy, Kannan and Venugopalan, 2017; Ariga *et al*., 2018), (Kannan and Venugopalan, 2018), literature reviews (Venugopalan *et al.*, 2014), (Vijayalakshmi and Ganapathy, 2016), (Subasree, Murthykumar and Dhanraj, 2016; Vijayalakshmi and Ganapathy, 2016), (Selvan and Ganapathy, 2016), In Vivo studies, (Jyothi *et al*., 2017), (Jain, Ranganathan and Ganapathy, 2017), (Duraisamy *et al.*, 2019), In vitro studies (Ganapathy *et al*., 2016), (Ajay *et al.*, 2017) and retrospective studies (Basha, Ganapathy and Venugopalan, 2018) were carried out by our team previously. Our department is passionate about research we have published numerous high quality articles in this domain over the past years ((Kavitha et al., 2014) , (Praveen et al., 2001),(Devi and Gnanavel, 2014), (Putchala et al., 2013), (Vijayakumar et al., 2010), (Lekha et al., 2014a, 2014b) (Danda, 2010) (Danda, 2010) (Parthasarathy et al., 2016) (Gopalakannan, Senthilvelan and Ranganathan, 2012), (Rajendran et al., 2019), (Govindaraju, Neelakantan and Gutmann, 2017), (P. Neelakantan et al., 2015), (PradeepKumar et al., 2016), (Sajan et al., 2011), (Lekha et al., 2014a), (Neelakantan, Grotra and Sharma, 2013), (Patil et al., 2017), (Jeevanandan and Govindaraju, 2018), (Abdul Wahab et al., 2017), (Eapen, Baig and Avinash, 2017), (Menon et al., 2018), (Wahab et al., 2018), (Vishnu Prasad et al., 2018), (Uthrakumar et al., 2010), (Ashok, Ajith and Sivanesan, 2017), (Prasanna Neelakantan et al., 2015). We are currently focusing on epidemiological studies. The main objective of this study was to evaluate which type of centric relation method is frequently used by the dental clinicians in an institutional setting. The main objective of the study is to find the most frequently used impression technique for tooth supported full mouth rehabilitation

MATERIAL AND METHODS

This study is retrospective and approval was given by the systematic review of saveetha dental college. Total of two members were involved in the study to collect data and to review them.

Sample Collection

Retrospective study has been conducted. A total of 98 sample data was collected from the saveetha dental college over a period of one year. Samples with improper data and repetitions were excluded from the study. All retrospective studies arising from the patient database of saveetha dental college between 01 June 2019 and 31 march 2020 will be covered by the following ethical approval number (SDC/SIHEC/2020/DIASDATA/0619-0320). Then the final sample size has come to 63 The data is then arranged and checked for the frequency of different impression techniques used in FMR treatment.

Inclusion Criteria

Patients undergoing tooth supported full mouth rehabilitation whose impressions were conventionally made.

Exclusion Criteria

Patients whose impressions were digitally made.

Dependable Variables include the type of impression technique used and tooth supported FMR. Independent variables includes sex, age and teeth

Statistical Analysis

The results of the study were subjected to statistical analysis. Data analysis was done using SPSS software. Frequency evaluation and Chi-square test was done to evaluate the type of impression technique used frequently in FMR treatment.

RESULTS AND DISCUSSION

In the retrospective study, a total of 63 has been reported, 58 of them followed the 2 stage putty wash impression technique.3 of them used 1 stage impression technique and 2 of them used 1 stage mono wash impression technique.(TABLE 1).

Among the reported data, 92.1% of them followed the 2 stage putty wash impression technique. 4.76% of them used 1 stage impression technique and 3.17% of them used 1 stage mono wash impression technique.(FIGURE 1)

A total of 13 cases were reported in upper arch, 12 in lower arch and the highest frequency is seen in both arches with an account of 38.(TABLE 2)

In 1 stage putty wash impression all the cases were reported in both arches with a count of 3 and 4.76% . In 2 stage putty wash impressions, the highest frequency of cases reported in both arch with a count of 33 and 52.38% followed by upper arch with a count of 13 and 20.63% and least frequency is seen in lower arch with a count of 12 and 19.05%. Association between the different types of putty wash impression techniques and different arches was done using Chi square test (Chi-Square Value = 3.573, Pearson's R Value = -.042 and *p*-value = .743) and found to be statistically nonsignificant.(FIGURE 2)

As mentioned; impression making of the tooth prepared and the surrounding tissues is undoubtedly one of the most important stages of the treatment. Thus; selection of the best and more accurate impression technique is necessary for a successful treatment.

In one stage impression technique; putty and wash material were mixed simultaneously, putty was placed in the tray, wash material is injected on the prepared and isolated tooth surface and impression was made with the applied pressure on the tray in the mouth during impression making.

In two stage impression technique; an impression was made with putty from the prepared tooth and the interdental papilla regions were removed. Then, several vents were created within the impression material, uniform thickness of wash material is applied on the tooth surface then on the tray and inserted into the mouth.

For one stage monophase impression; the monophase material is inserted onto the tooth surface and on the special tray fabricated and then inserted in the mouth with firm pressure.

Better marginal adaptation at the margins can decrease the rate of fracture by increasing the consistency, can decrease microbial plaque, periodontal disease and complications consequently. The marginal gap is less in the copings of two stage impressions.

However, while taking one stage impression the force application by thumb finger on the tray during impression taking may dislodge the impression tray from other sites (mesial,distal and lingual) which is compensative in two stage technique with wash. The marginal gap is compensated by wash material in the second stage, whereas in one stage; we don't have the second stage for compensating the marginal gap in such surfaces.

Some studies , they recommended two stage putty wash impression.(Luthardt *et al.*, 2006),(Brown, 2004) and in some studies, the one-stage putty-and-wash impression technique was found to be more accurate.(Rudolph *et al.*, 2013),(Bader and Setz, 1991)

CONCLUSION

Because of the better adaptation of the framework the two stage impression technique was mostly preferred here, especially for subgingival preparation margins. The improved representation of subgingival margins was supposed to be caused by the imposed pressure of the putty material on the light body impression material. Within the limitations of the study it was found that double cord impression technique was mostly preferred while taking the impression of full mouth rehabilitation cases. Study should be conducted in larger samples in future to assess the accuracy of the impression materials in different treatment scenarios.

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Author contributions

First author, Dr. Sai Teja Reddy collected the raw data, performed the analysis, and interception and wrote the manuscript. Second author, Dr Nabeel Ahmed contributed to conception , data design, analysis interpretation and critically revised manuscripts. The third author, Dr. Keerthi Sasanka Participated in the study revised the

manuscript as per guideline, alignments and formatting . All the authors have discussed the results and contributed to the final manuscript .

Conflict of interest

None Declared

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Table 1: The table shows the frequency of different impression techniques used in tooth supported full mouth rehabilitation. It was observed that the 2 stage putty wash impression technique was used more than other techniques.

Impression Technique	Frequency	Percent
1 Stage Putty Wash	3	4.8
2 Stage Putty Wash	58	92.1

1 Stage Mono Wash	2	3.2
Total	63	100.0

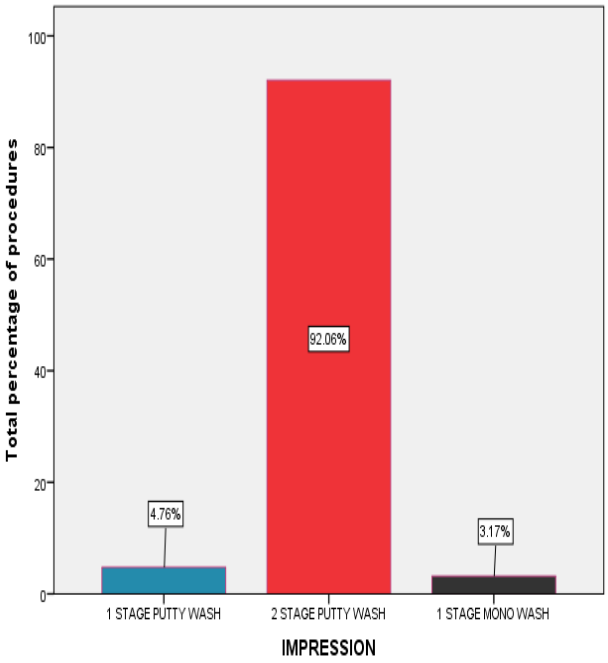

Fig.1: The bar diagram depicts the percentages of impression techniques used in tooth supported full mouth rehabilitation cases. X axis represents the techniques of impressions used and Y axis represents the total percent of procedures involving impression techniques: 1 stage putty wash impression; 2 stage putty wash impression; and 1 stage Mono wash impression. It was observed that the 2 stage putty wash impression technique was used more than other techniques.

Table 2: The table shows frequency and correlation of different types of putty wash impression techniques with different arches.A total of 13 cases were reported in upper arch, 12 in lower arch and the highest frequency is seen in both arches with an account of 38.Association between the different types of putty wash impression techniques and different arches was done (*p*-value - .743) and it was found to be statistically not significant.

IMPRESSION	ARCH			Total	
	UPPER ARCH	LOWER ARCH	BOTH ARCH		
1 STAGE PUTTY WASH	0	0	3	3	Pearson Chi-Square Value - 3.573
2 STAGE PUTTY WASH	13	12	33	58	P-value- .743
1 STAGE MONO WASH	0	0	2	2	
TOTAL	13	12	38	63	

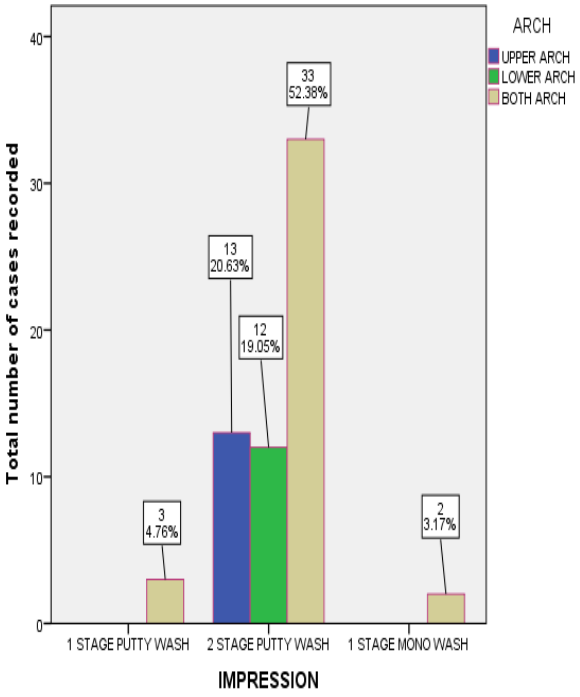

Fig.2: The bar diagram depicts the association of different types of putty wash impression techniques and different arches where it is used. X axis represents the techniques of impressions used and Y axis represents the different arches/regions where it is used: upper arch; lower arch; and both arches. Association between the different types of putty wash impression techniques and different arches was done using Chi square test (Chi-Square Value = 3.573 and *p*-value = .743) (p >0.05) and found to be statistically not significant. Although statistically not significant it is implied that the 2 stage putty wash technique was widely used in both the arches rather than other impression techniques.