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TO ASSESS THE IMPRESSION ACCURACY IN CAPTURING THE UNPREPARED TOOTH SURFACE IN FPD PROCEDURES DONE BY GRADUATE STUDENTS

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Keywords: flash ; unprepared tooth surface ; impression ; fixed partial dentures ; graduate students

ABSTRACT:

Accurate impressions are a critical ingredient in our ability to deliver quality prosthesis to patients. An accurate well taken impression has many qualities, but the key factor is obtaining adequate margin flash.

To assess the impression accuracy in capturing unprepared tooth surfaces in fixed partial denture procedures done by graduate students.

The study was performed in the out patient department of Saveetha Dental College. Data required for the study was procured from the Dental Information Archiving Software. A search was done on the digital case sheets recorded between june 2019- february 2020 from the department of Prosthodontics. The search led to a 4200 plus information on fixed prosthesis impression. The data was sorted in excel and statistically analysed using the IBM SPSS software analysis and the results tabulated.

The unprepared surface of the tooth is recorded well in all impressions except in few with regard to mesial, lingual surfaces which are statistically significant and thicker light body impression was observed.

Graduate trainee students are able to record the impression of the unprepared surface of the tooth with great details except very few specific areas not being recorded and secondary outcomes such as putty exposure through light body impression required improvisation.

INTRODUCTION

Impression making for fixed partial dentures are technique sensitive because accurate reproduction of the finish line is essential for fabrication of a fixed partial denture. An accurate well taken impression has various qualities, but the key ingredient is obtaining the adequate margin flash. Flash is the amount of impression material that captures the tooth beyond the impression margin [1,2]. The extra material that has gone past the margin is vital to the technician as they fabricate the final prosthesis [3,4]. The thickness of the band of flash is critical and highly dependent on the effectiveness of tissue retraction, when the teeth have been prepared sub gingivally [5–7].

Transfer of the accurate impression that is replication of the hard and soft tissue to the dental laboratory is important. The ability to identify and analyze inaccurate impressions and to understand how to avoid them is the key to successful restoration [8,9]. There are various techniques and materials to take impressions for fixed partial dentures, each having their own set of pros and cons. [10,11]

Since impressions replicate both the teeth and the gingiva, success is based on the understanding of the anatomy of periodontal tissues, creating an accurate and decipherable impression especially the finish line, using the correct impression technique and appropriate impression materials [12–15]

A successful dental restoration is dependent on the impression recorded. Any failure to record an impression leads to excessive adjustments, thereby loss of chair side time and losing the patient's trust . Many studies report that the putty wash dual phase technique of recording flash is one of the best methods [16–18]. This is imperative as both the material and the technique influence the output of the impression.

Dentists face numerous clinical challenges and evaluating self performance for quality assurance can be demanding [19,20]. Accurate marginal positioning of the restoration in the prepared finish line of the abutment is required for therapeutic, preventive and esthetic purposes. If the prepared finish line is adjacent to the gingival sulcus, gingival retraction techniques should be used to decrease discrepancy among the restoration and prepared abutment [21,22].

Several factors affect the success and durability of the impression, these include air bubbles and voids, temperature, humidity, retraction cord attached to the impression, disinfection, pouring time, type of gingiva, the preparation itself, flow problems such as putty exposure through wash impression etc. [23,24] The gingival margin should be clean and available during impression making, allowing adequate flow of the impression material on it. Gingival sulcus must be wide enough. Cord packing is a key to flash recording [25,26]. Accurate impressions are obtained usually with the sulcular width of 0.15mm to 0.20mm, as a sulcular width less than this the impression material is unable

to resist against the rupture and deformation, thereupon the margin accuracy is reduced.

Obtaining the 360 degree flash is essential in the anterior as well as posterior region [27,28] Although some studies do cite that the type of gingiva, especially the interdental gingiva has an impact on the impression, causing improper impressions, adequate gingival retraction and fluid and moisture control techniques must be adopted, assessing the requirement of the condition. Uniformity of the impression in the anterior as well as the posterior region is important [29,30].

The aim of the study is to evaluate the impression accuracy in capturing unprepared tooth surfaces in FPD procedures done by graduate students.

MATERIALS AND METHODOLOGY

The study was performed in Saveetha Dental College. Data required for the study was procured from the Dental Information Archiving Software. A search was done on the digital case sheets recorded between june 2019- february 2020 from the department of Prosthodontics. Ethical approval was obtained from the institutional committee (ethical approval number : SDC/SIHEC/DIASDATA/0619-0320). The search led to a 4200 plus information on fixed prosthesis impression. Further the search was narrowed down for single or two units missing replacements and other inclusion criteria. This led to documented evidence of 777 number of digital case records. Evaluation of the data was done in the presence of additional reviewers, photographs of the impressions, procedure notes. All the available data were included, no sorting process done to minimise any sampling error. Internal validation was done to make sure all fpd cases met inclusion criteria. Any replication of patient data in different time periods or treatment planning. The data was entered methodologically in excel and manually verified. Incomplete data were excluded. Analysis of the tabulated data was done using the IBM SPSS software analysis. The following parameters were assessed :

- Flash - mesial - present / absent
- Flash - distal - present / absent
- Flash - lingual - present / absent
- Flash - buccal - present / absent
- Putty exposure through wash - present / absent
- Retraction cord attached to impression - present / absent
- Clinical year - UG-3 / UG-4 / INTERN / PG

Descriptive analysis performed and the results interpreted in graphs, and the data was subjected to statistical analysis chi squared test with the level of confidence set at 95%.

RESULTS AND DISCUSSION

Totally 777 impressions were analysed for various parameters that impact the accuracy of the impression in capturing the unprepared tooth surface in the fixed dental prosthesis.

There is a generalised difference among students in recording the unprepared tooth surface between different years of training. There are missing mesial and distal flash surfaces of impressions at 17% among new graduate trainees and among other graduate trainees 19% of lingual flash surfaces had deficiencies [Figure 1, Figure 3]. All above findings were statistically significant

($p<0.05$). Previous literature also cites that about 80% of the impressions have a good and clear margin recorded in their study. The present study indicates a similarity from the previous literature, the mesial flash deficiencies can be attributed to the fact that gingival biotype at interdental gingival region, flow of material, adequate finish margin in preparation and moisture control. The lingual flash deficiencies were also interrelated to indirect vision in some cases, disturbances from tongue and surrounding soft tissue [31]. The incidence among students for recording buccal surface of the unprepared tooth surface was statistically insignificant ($p>0.05$) [Figure 2, Figure 4]. This can be attributed to the fact that a well accessible area for preparation, good gingival retraction, adequate finish line preparation, and visibility leading to a few errors. The study evaluated the secondary outcomes such as instances of presence of remnants of cord in the flash of impression, but it was statistically not significant ($p>0.05$) [Figure 5]. Previous literature also cites similar outcomes and this could be attributed to use of braided cords and some cord strands getting on to finish lines during impression procedure because of the gingival biotype. [32].

Exposure of putty through wash impression in this study was less, this secondary outcome was significant ($p<0.05$), indicating thicker light body impression surface was present [Figure 6]. This could indicate either operators were not creating enough spacer for relining impression material or they were using excess relining impression material. Previous literature is not in concordance with our study results which indicated more putty see through the light body. [33,34]. The study was done retrospectively with the available data but can be planned prospectively to assess about the factors leading to some of the deficient flash surfaces or with regard to thickness of impression or compared to digital impressions.

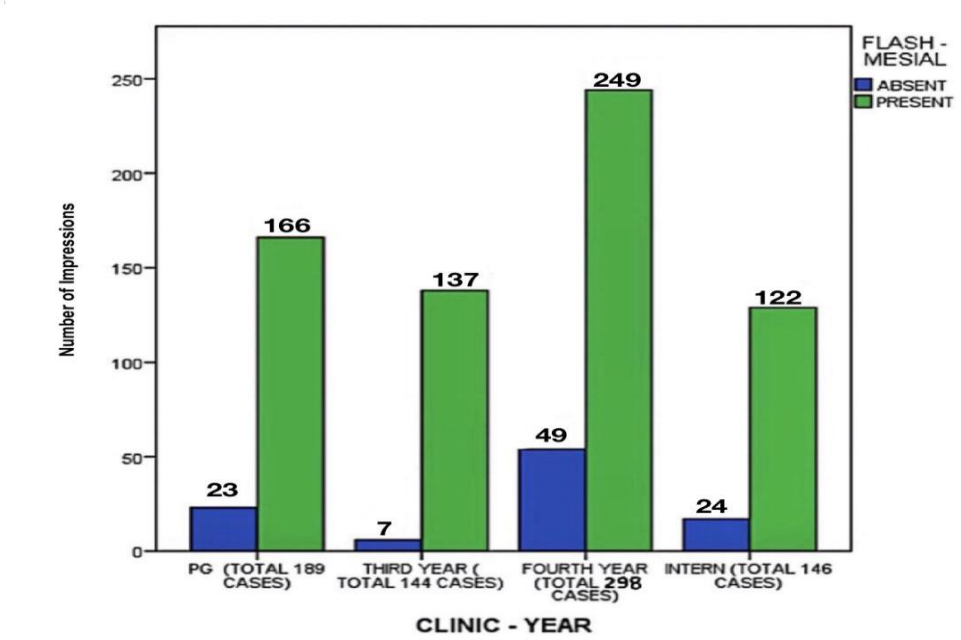

Figure 1 : Bar chart depicts the frequency of recording of flash - mesial among various clinical years, y-axis represents the count of number of

impressions, x-axis represents the various clinical years. The total presence of mesial flash was 87% and absence of mesial
flash was 13%. Chi square test was done and the presence of mesial flash among various clinical years was found to be statistically significant. (Pearson Chi square value 17.333, df = 3, p-value = 0.001, p<0.05 - significant). Hence the correlation study indicating 16.7% of the final year and 16.4% of the interns impression had irregular mesial flash.

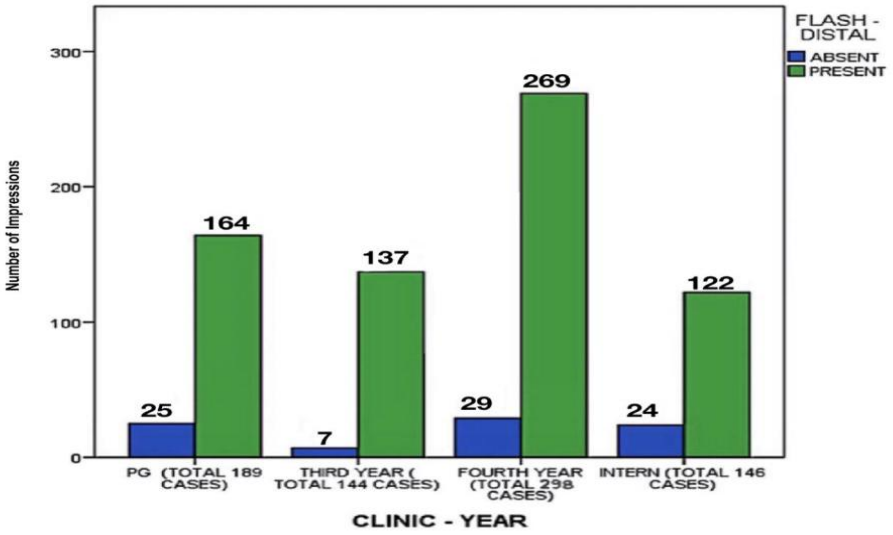

Figure 2 : Bar chart depicts the frequency of recording of flash - distal among various clinical years, y-axis represents the count of number of impressions, x-axis represents the various clinical years.The total presence of distal flash was 89% and absence of distal flash was 11%. Chi square test was done and the presence of distal flash among the various clinical years was found to be statistically significant. (Pearson Chi square value 17.333, df = 3, p-value = 0.001, p<0.05 - significant). Hence the correlation study indicating 16% of the Interns impression recorded had irregular distal flash compared to all other years of study.

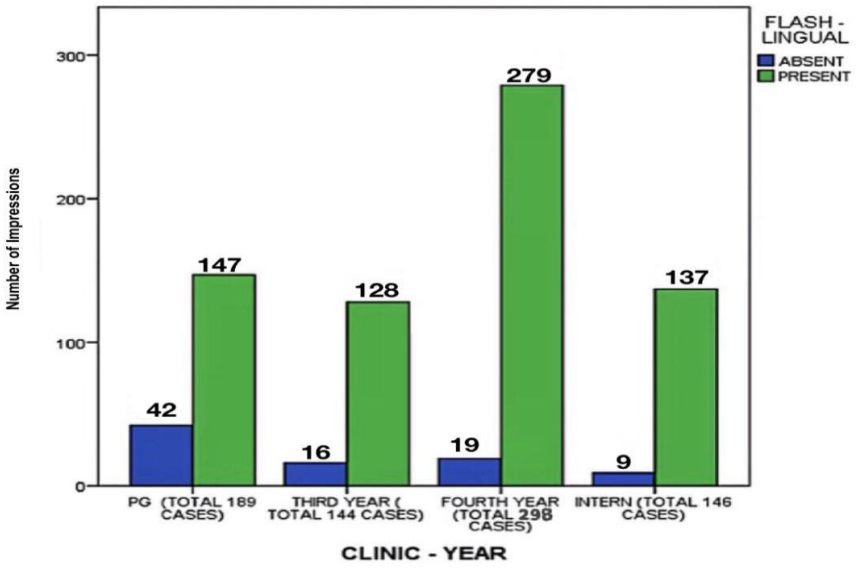

Figure 3 : Bar chart depicts the frequency of recording of flash - lingual among various clinical years, y-axis represents the count of number of impressions, x-axis represents the various clinical years.The total presence of lingual flash was 89% and absence of distal flash was 11%. Chi square test was done and the presence of lingual flash among the various clinical years was found to be statistically significant. (Pearson Chi square value 34.122, df = 3, p-value = 0.000, $p<0.05$ - significant) Hence the correlation study indicating 20 % of the post graduates impressions had irregular lingual flash.

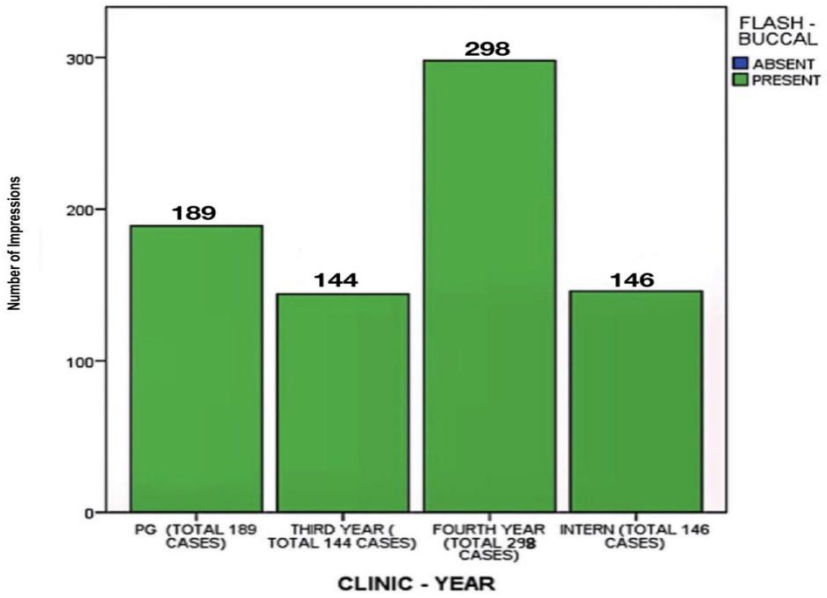

Figure 4 : Bar chart depicts the frequency of recording of flash - buccal among various clinical years, y-axis represents the count of number of impressions, x-axis represents the various clinical years. It was found that buccal flash was present in all the impressions among all the clinical years as

observed in this study. Hence indicating recording buccal flash was uniformly present among all the years of study.

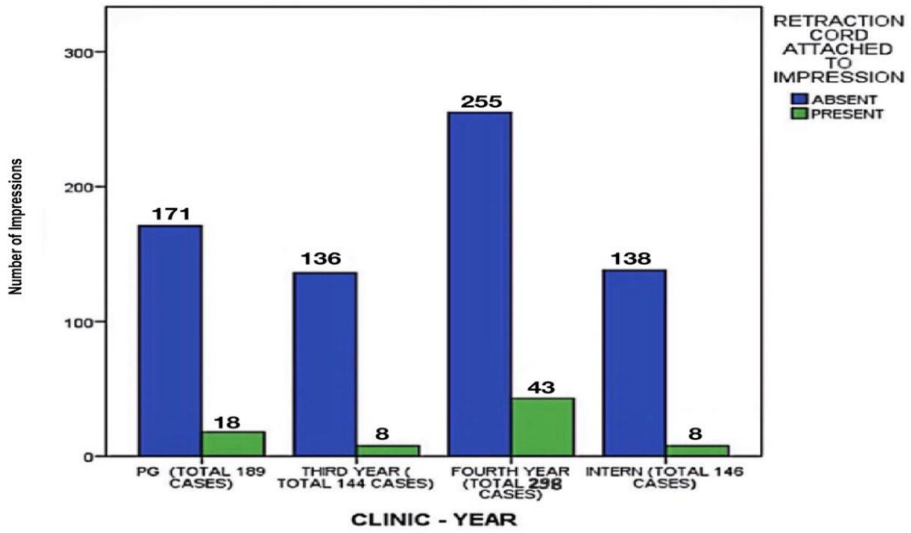

Figure 5 : Bar chart depicts frequency of remnants or signs of retraction cord attached to impression among various clinical years, y-axis represents the count of impressions, x-axis represents the various clinical years. The total absence of remnants of cords was 90% and presence of it was 10%.Chi square test was done and the absence of remnants of retraction cord in the flash among the various clinical years was found to be statistically significant. (Pearson Chi square value 13.118, df = 3, p-value = 0.004 - significant). Hence the correlation study indicates 14% of the final year impression had presence of remnants of cord in the impression recorded.

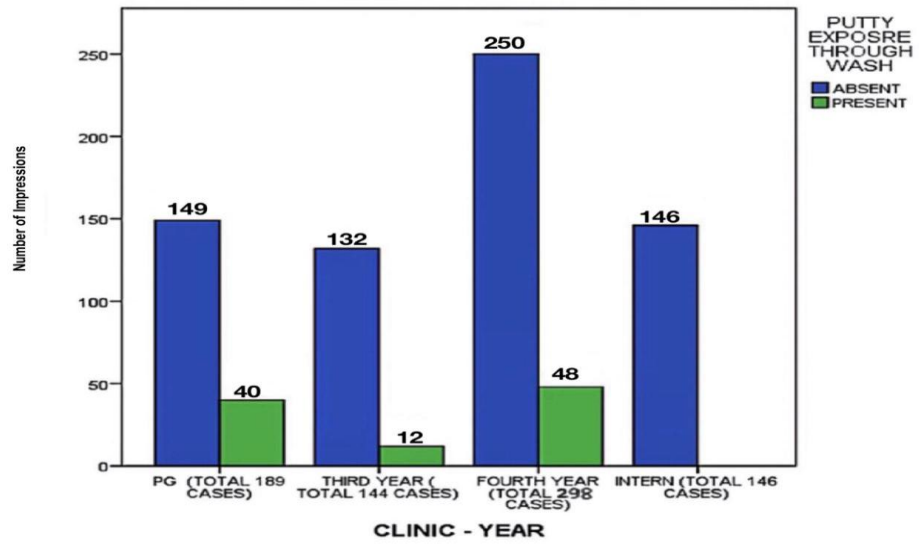

Figure 6 : Bar chart depicts frequency of putty exposure through wash impression among various clinical years, y-axis represents the count of number of impressions, x-axis represents the various clinical years. The total

complete putty exposure absence was recorded at 87% and putty exposure presence at 13%. Chi square test was done and the absence of putty exposure through wash impression among the various clinical years was found to be statistically significant. (Pearson Chi square value 38.588, df = 3, p-value = 0.000, $p<0.05$ - significant). Hence the correlation study indicating the putty see through was less among the impressions recorded by the interns .

CONCLUSION

The unprepared tooth surface is recorded well in all impressions among the graduate trainees except few areas such as mesial, distal or lingual surfaces which is statistically significant. The retrospective analysis also indicates a better control required over the thickness of light body impression recorded by the graduate students.

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AUTHOR CONTRIBUTION

Ramya. G carried out the retrospective study by collecting data and drafted the manuscript after performing the necessary statistical analysis. Dr. Suresh aided in the conception of the topic, participated in the study design, statistical analysis and supervised in the preparation of the manuscript. Dr. M. Jeevitha has participated in the study design and has coordinated in developing the manuscript. All the authors have equally contributed to the development of the manuscript.

CONFLICT OF INTEREST

None declared.

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