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An evaluation of fixed partial denture impressions sent to Dental laboratories in Ahvaz in 2015

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Abstract

Background and Objective: One of the unpleasant experiences in clinical practice is incomplete settlement of crowns or bridges that are fully fitted on the die, but they do not lie on the base teeth and are away from the teeth. Most of these changes are the result of an imprecise impression. It is necessary for a dentist to check carefully the taken impressions before sending them to the laboratory. The aim of this study was to evaluate the quality of the impressions sent to a dental laboratory for fabrication of the fixed partial dentures and frequency distribution of clinical failures and the relationships between different variables. **Material and Methods :** A total of 164 fixed partial denture (FPD) impressions sent by 60 dentists to a dentistry laboratory in Ahvaz city from October to March 2015, for the confidentiality of the dentist's name the impressions, were coded and evaluated. Defects, including bubbles and rupture in the finishing line area, exposure of putty through the wash, inadequate retainment of molding material to terry, pressure of terry on soft tissue, defects in smoothness of molding material, were documented. Then, the data were analyzed. **Results:** In this study, all impressions were among condensation silicone material prepared from a flexible plastic terry, and using a double-step technique. Of impressions, 89.6% had at least one error in finishing line area. **Conclusion:** impressions sent for fabrication of fixed partial denture had visible errors; so, dentists need to evaluate carefully impressions before sending to the laboratory.

Keywords: fixed partial denture (FPD); impression; specific terry.

Introduction

Often inlay or onlay restorations of Casts, the ceramic and full- ceramic metal crowns and bridges are made on the cast indirectly. One of the critical steps of this method is preparing and sending an exact impression to the laboratory (Chiche GJ, 1994).

Often dentists have experienced an undesirable impression. Success key in this is the ability to detect

and analyze adverse impressions and learn ways to prevent them (Chee WW et al., 1999; Idris B et al., 1995) There are several factors involved in the preparation of a desirable impression, including understanding the anatomy of the periodontal tissues, correct and precise carving of tooth or base teeth, (especially in the area of finishing line), the use of the materials and techniques of

the right impressions (Chiche GJ, 1994; Millar B; Anusavice KY, Phillips RW, 2003).

Each of these factors alone does not suffice to access a desired impression. A lot of articles and studies have been presented about the accuracy of impressions (Laufer BZ et al., 1996; Carrotte PV et al., 1998).

Most studies have been in the laboratory and only a few have been in relation to clinical quality of the impressions (Winstanley RB et al., 1997; Carrotte Pr et al., 1993). before sending the impression the dentist must check them carefully.

The aim of this study was to assess the quality of fixed prosthesis impressions sent to private Labs, in terms of the frequency of visible technical errors and determine the relationship between the various factors.

Technical errors, which were evaluated solely through the observation immediately after the sending to the laboratory, were as follows:

- 1) defects or rupture in finishing line;
- 2) exposure of putty through the wash;
- 3) Air bubble in finishing line area;
- 4) pressure of terry on soft tissue;
- 5) inadequate retainment of molding material to terry;
- 6) to be caught of the gingival *retraction cord* inside the molding

Out of 164 impressions, 278 errors were seen as follows:

defects or rupture in finishing line	74 (26.6%)
Air bubble in the finishing line area	51 (18.4)
exposure of putty through the wash	79 (28.4%)
to be caught of gingival <i>retraction cord</i> inside the molding material	1 (0.4%)
inadequate retainment of molding material to terry	9 (3.2%)
pressure of terry on soft tissue	20 (7.2%)
defects in smoothness of molding matter	44 (15.8%)

In this study, Of the 164 impressions, 17 (10,4%) were recorded separately as non-visible error; seven (4,3%) as defects or rupture in finishing line; 13 (7.9%) as air bubble in finishing line area; 22 (13.4%) as exposure of putty through the wash; one (0.6%) as to be caught of gingival *retraction cord* inside the molding material;

material; and 7) defects in smoothness of molding matter.

Materials and Methods

In this descriptive cross sectional study, the sample size included 164 fixed denture impressions by 60 dentists sent to the laboratory of Ahvaz city. This information was collected by visiting daily to three laboratories in Ahvaz city. For each impression a form was completed and these errors were inserted into that form. Viewed items and relationship between them were calculated by a Statistics specialist using the Cramer V correlation method. In order to observe the ethical issues, name and information for all individuals participating in the study were kept and protected confidential.

Results

in this study, of 164 impressions 92 (56.1%) were maxilla and 72 (43.9%) were mandible, all impressions were made from condensation silicone material and flexible plastic terry, using double-step technique. Of impressions, 72 (43.9%) were prepared with gingival *retraction cord* and 92 (56.1%) without gingival *retraction cord*. Of impressions, 43 (26.2) were single unit and 92 (56.1) were 2- or 3-unit and 29 (17.7) consists of 4 or more prepared basic teeth.

three (1.8%) as inadequate retainment and separating of molding material from terry; five (0.3%) as defects in smoothness of molding matter. The impressions with one error were 74 (54.1%), with two errors were 53 (32.4%), three errors were 33 (20.1%) and with four errors were four (2.4%).

Table 1. The absolute and relative frequency of jaw type

Impressions of jaws	Absolute frequency	Relative frequency
High	92	56.1%
Low	72	43.9%
Total	164	100%

Table 2. The absolute and relative frequency of type of molding material

Impressions of jaws	Absolute frequency	Relative frequency
Additive silicone	0	0
Condensational silicone	164	100%
Polyether	0	0
Total	164	100%

Table 3. The absolute and relative frequency of type of molding technique

Molding technique	Absolute frequency	Relative frequency
Single copper band	0	0%
Single step	0	0%
Double step	164	100%
Mono phase	0	0%
Total	164	100%

Table 4. The absolute and relative frequency of type of molding technique

molding techniques in terms of gingival retraction cord	Absolute frequency	Relative frequency
Without gingival <i>retraction cord</i>	92	56.1%
With gingival <i>retraction cord</i>	72	43.9%
Total	164	100%

Table 5. The absolute and relative frequency of type of molding terry

type of molding terry	Absolute frequency	Relative frequency
Specific terry	0	0%
Metal terry	0	0%
Plastic terry	164	100%
Total	164	100%

Table 6. The absolute and relative frequency of numbers of the prepared teeth

Numbers of the prepared base teeth	Absolute frequency	Relative frequency
Single unit	43	26.2%
Two to three basic teeth	92	56.1%
4 and more	29	17.7%
Total	164	100%

Table 7. The absolute and relative frequency based on the type of error

Type of error	Absolute frequency	Relative frequency
No error	17	10.4%
A defect or rupture in the fishing line area	7	4.3%
Air bubbles in the fishing line area	13	7.9%
exposure of putty through the wash	22	13.4%
to be caught of gingival <i>retraction cord</i> inside the molding material	1	0.6%
inadequate retainment of molding material to terry	3	1.8%
pressure of terry on soft tissue	6	3.7%
defects in smoothness of molding matter	5	3.0%
Impressions of two types of errors	53	32.3%
Impressions of three types of errors	33	20.1%
Impressions of four types of errors	4	2.4%
Total	164	100%

Table 8. The absolute and relative frequency based on the type of error

The number of the error	Absolute frequency	Relative frequency
No error	17	10.4%
An error	57	34.8%
two errors	53	32.3%
Three errors	33	20.1%
Four errors	4	2.4%
Total	164	100%

Table 9. The absolute and relative frequency based on the number of error

Type of error	Absolute frequency	Relative frequency
A defect or rupture in the fishing line area	74	26.6%
Air bubbles in the fishing line area	51	18.4%
exposure of putty through the wash	79	28.4%
to be caught of gingival <i>retraction cord</i> inside the molding material	1	0.4%
inadequate retainment of molding material to terry	9	3.2%
pressure of terry on soft tissue	20	7.2%
defects in smoothness of molding matter	44	15.8%
Total	278	100%

Table 10. Comparison of the relationship between the number of prepared basic teeth and error number

Error number	The single - unit base tooth	The prepared 2-3-unit base tooth	The prepared 4 - or more- unit base tooth	Total	percentage
No error	12	5	0	17	10.4%
An error	21	29	7	57	34.75%
two errors	7	35	11	53	32.3%
Three errors	2	21	10	33	20.1%
Four errors	0	3	1	4	2.4%
Total	42	93	29	164	100%

Research hypothesis: is there a relationship between gingival *retraction cord* and number of error?

Variable	k2	D.F	Significance
dental floss and number of error	5.648	8	0.227

The result of the above tables indicates that there was no significant relationship between gingival *retraction cord* and number of error ($p = 0.227 > 0.05$ and $k^2 = 5.648$).

Research hypothesis: is there a relationship between the number of the prepared teeth and the error number? In order to test the above hypothesis, the chi-square test χ^2 was used and presented in the following table.

Variables	k2	D.F	significance
the number of the prepared teeth and the error number	37.17	8	0.000

As The above table shows there is a significant relationship between the number of the prepared teeth and the error number ($P < 0.05$) and ($k^2 = 37.17$).

Discussion

In this study, the impressions have been studied as follows:

1) the type of molding terry; 2) type of molding material; 3) molding technique in terms of one step, two steps and use of Copper ring; 4) the type of techniques in terms of use of gingival *retraction cord* without it; and 5) types of molding errors.

2) The type of molding terry: in our study, 100% of impressions was cast with a soft plastic terry. Whereas in Sam et al. study, the rate was 54.9% and the rest included 5.0%, specific terry; 11.9%, stiff specific terry; and 33.7%, meta terry. The lack of variety of terry, is probably due to the type of training in the faculties and the kind of common molding material in the country. The use of plastic terry in other studies has the highest amount. The impressions taken with this terry does not show a detectable defect, but studies have determined that due to the flexibility of these terries, impression taken will not have sufficient accuracy (10).

Type of molding material: In a study by Samet et al., 19.7% of The impressions taken were polyether; 26.4% were condensation silicone; and 53.9% were additive silicone. In a study by Winstanley et al., they used silicones to an extent of 85%, but they did not specify their type (10). In our study, all impressions have been taken with condensation silicone that cause for it use may be the frequency and ease of operation.

3) molding technique: In the study by Samet et al., diversity can be seen in molding techniques. But the scope of our study there was no diversity in this area. The main reason for The absolute frequency of two-stage technique is probably related to our training in dental schools of the country. In the same study, all three types of impression material, area common one-stage technique that it seems its frequency is related to the need to spend less time.

4) The type of techniques in terms of use of gingival *retraction cord* without it: 56.1% of the impressions in our study were without a gingival *retraction cord*. This percentage is a great number and probably related to being bored dentist.

5) Error type: Seventeen (10.4%) of the 164 impressions have had no error and the rest have had one or more errors. These results are consistent with the results of other studies. In the study by Samet et al., 89% error can be seen and also this result is consistent with the Winstaley and Carrotty et al., but their indices are different from our study. They studied retainment of the molding matter to terry, the accuracy and precision in recording the finish line in the impression (Carrotte PV et al., 1997). In our study, 26.6% of rapture or defect were in the finish line area

and 18.4% of the bubble were in the in the finish line area.

This error is probably because of a problem in the contact between resin material and the tooth in areas containing biological fluids and air and the lack of precision in insertion of the resin around the prepared tooth and early to remove the template from the mouth.

Perhaps at the stage of working the dentists feel the polymerization is full, whereas the manufacturer's factory has recommended more time. In this study, just taken dyes have been investigated and more research for the evaluation of dyes and the final restoration is necessary. Perhaps by re-investigation of the final cast and further clarify the technician sends the impression to the dentist office for further review.

Conclusion

According to this study, impressions taken with condensation silicone had many obvious errors.

1. it is recommended that dentists more carefully check the impressions taken before sending to the lab.
2. it is recommended that technicians carefully check the impressions and if they contain errors of these, refer them to offices.

Conflict of Interest statement

The authors declare that there is no conflict of Interest.

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