

## دراسة متصالبة لتقييم جودة الطبغات للتيجان والجسور لدى الممارسين العاميين في مدينة دمشق

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### الملخص

**خلفية وهدف البحث:** تعدُّ الطبعة السنوية إحدى المراحل المهمة عند صنع الترميمات السنوية غير المباشرة. هدفت هذه الدراسة إلى تقييم جودة الطبغات للتيجان والجسور في الممارسة السنوية العامة.

**مواد والبحث طرائقه:** تم تقييم 165 طبعة سنوية وردت إلى مخابر سنوية في مدينة دمشق وذلك في مدة إجراء الدراسة (6 أشهر في عام 2008) بالاعتماد على مجموعة من العوامل المتعلقة بالجودة في قسم التعويضات الثابتة في جامعة دمشق.

**النتائج:** وجد أن مادة الألبينات استخدمت تقريباً في ثلثي الطبغات السنوية العاملة (الحاوية على التحضيرات). استخدمت الطواع البلاستيكية المرنة في 73,9% من الطبغات، منها 10% فقط استخدمت أول مرة. وجد أن أكثر من نصف طبغات الألبينات لم تكن مثبتة بشكل جيد على طواعها. كما وجد أن التشوهات في طبعة التحضيرات السنوية بالخاصة كانت شائعة، فضلاً عن إهمال مبدأ مكافحة العدوى للطبغات المدروسة.

**الاستنتاج:** إن واقع جودة الطبغات السنوية للتيجان و الجسور في الممارسة السنوية العامة في سورية مقلق في حال كانت العينة المأخوذة في الدراسة الحالية تمثل مجتمع الطبغات السنوية. لذلك يجب الانتباه إلى هذا المجال أكثر في أثناء مدة الدراسة في الجامعات.

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# Assessment Of The Quality Of Impressions For Crown And Bridgework For General Dental Practitioners In Damascus City (A Cross-Sectional Study)

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## Abstract

### Background and aim:

The impression is one of the important stages when making indirect restorations. The aim of this study was to assess the quality of impressions for crown and bridgework made in general dental practice.

**Methods:** 165 cases which had been received by the laboratories in Damascus city on the days of the visits (during 6 months in 2008) were assessed for a number of factors related to quality, in Fixed Prosthodontics Department in Damascus University.

**Results:** Alginate was used in nearly two thirds of working impressions for crown and bridgework in general dental practice. Flexible plastic trays were used for the majority of cases (73.9%), Only 10 % of them were new. More than half of the alginate impressions were not firmly fixed to the trays. Defects in the recording of the prepared teeth were common, and cross infection control was not routine.

**Conclusion:** Quality of impressions for crown and bridgework in general dental practice in the Syria is a cause for concern if the sample of cases seen in this study is typical. So, more attention should be paid to this aspect during the undergraduate study in universities.

INDEX WORDS: Impression quality

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## Introduction

Impression is defined as an imprint of the teeth and adjacent structures<sup>(1)</sup> and considered one of the most important stages when making indirect restorations. The textbooks of fixed prosthodontics have whole chapters for this purpose<sup>(2,3)</sup>. Well-fitting indirect restorations can only be made if there are accurate models of the oral tissues available, made from high quality impressions. Waiting for an impression to set may be more stressful for the dentist than the patient. Should the impression need to be repeated there is the embarrassment of having to explain this to the patient, the cost implications of material and time wasted and the aggravation of running late for the next appointment. Yet, if a 'Nelsonian' eye is turned to a defective impression we can only expect a substandard restoration in return<sup>(4)</sup>.

Some universities try to be involved (Sheffield University, UK) in monitoring the quality of crown and bridge work provided for patients in general dental practice for a number of years<sup>(5)</sup>.

An initial survey by Sheffield university<sup>(5)</sup> involving 50 impressions submitted to a large commercial laboratory concluded that:

- Over half the impressions exhibited major faults which would result in the finished restorations having deficient margins
- The standard of cross infection control fell far short of recommended guidelines.

The present study aims to look at the quality of impressions for crown and bridgework received at some commercial dental laboratories in Damascus. Several factors were observed: Type of tray, type of material, disinfection procedures and accuracy.

## Materials and methods

A cross-sectional observational study of five selected commercial dental laboratories in Damascus which were known to receive different types of restorative work were each visited on three occasions by the author, from Fixed Prosthodontics Department in Damascus University, during the period of six months in 2008. All cases requiring conventional crown and bridge work which entered the laboratories on these occasions were examined (ie Porcelain veneers, implants or adhesive bridges were excluded). The impressions were looked at before they were casted. Magnification Loupes (X2) were used when examining the impressions for defects, and assessment methods were the same in all cases.

The assessments, which were recorded on a standardised form, can be seen in Table 1.

## Results

The total number of individual cases examined at the five commercial laboratories was 165, comprising bridges (62), crowns (95), and post crowns (8). Where more than one individual restoration was requested from the same working impression this was recorded as one in the total number of cases in order to avoid confusion in the results. A panoramic view of the main results are presented in Tables 2 and 3.

### Working impression

One hundred and twenty two impressions (73.9 %) had been made using plastic disposable trays. Ninety four of them had been used previously (as indicated by plaster/stone or previous impression material), and fifteen were of the sectional variety (all of the latter have been re-used). Metal trays were used in 43 cases (26%).

Fifty three impressions (32.1 %) were taken with silicone putty and wash (Fig1). The rest of the impressions (112) were made using alginate impression material. There was no evidence of contamination with 8 of the cases, but 157 (95.2%) were obviously contaminated with blood, plaque, food, or other debris. The majority of alginate impressions were stored wet (only three dry), although some were soaking wet and others merely slightly damp.

Forty nine silicone impressions were securely fixed to the trays (92.5%), with only 4 unsatisfactory in this respect, either pulling away from, or having come away entirely from the impression tray (Fig2). Whereas, seventy two alginate impressions (64.3%) were unsatisfactory fixed to their trays. The number of cases with defects on the prepared teeth amounted to 67(59.8%) for alginate (where there was more than one prepared tooth but only one had a defect in a single impression, this was counted a one in the total number of cases), and 10 (18.9%) for silicone. The majority of defective preparations showed indefinite margins, presumably due to incorrect tissue management .

### Opposing arch impression

One hundred and thirty nine of impressions (84.2 %) were made using plastic disposable trays of the flexible variety (Fig 3). Of these, 123 had been re-used and eleven trays were sectional (all of the latter having been re-used). Only alginate was used in all the impressions.

The majority of alginate impressions were stored wet (only seven dry), although some were soaking wet and others merely slightly damp. Ninety two (55.8%) were visibly contaminated with blood and/or debris.

One hundred and four of the alginate impressions (63%) were not adequately fixed to the trays (Fig 4), and 22 had defects which would have posed problems when trying to articulate the casts in order to produce a satisfactory occlusion for the restoration.

Occlusal record was sent in one hundred and nineteen cases (72%). Red wax was used in all the sent occlusal records.

## Discussion

Most of the papers describe the variety of impression materials and techniques which can be employed in different situations, each of which can be highly successful, but only if attention is paid to the detail of their execution and the clinician is aware of their individual limitations and pitfalls<sup>(6)</sup>.

However, the fact that the reality dentistry is different from what is written in the books and papers leads to assess the quality of dental work in current delivery system which would be useful in knowing the progress of the dental profession. A recent study has investigated the quality of prescription and fabrication of single-unit crowns by general dental practitioners in Wales<sup>(7)</sup>.

Actually the impression quality has also been compared between European countries by Winstanley<sup>(8)</sup>. Also the quality of dental casts used in crown and bridgework in the UK had been investigated in a previous study<sup>(9)</sup>.

Simple criteria for assessing impressions was used in this study. The type of tray, type of material and the condition of the impression (fixation to the tray, contamination) were the main points investigated in this study.

The necessity of using rigid trays when making working impressions for crown and bridge work is well documented<sup>(10-12)</sup>. However, the findings of this study show that in general dental practice, such impressions are being made almost routinely (73.9 %) with disposable plastic trays of a type which are too flexible to ensure accuracy.

However, they do offer the benefit that, because they are disposable, they are less of a risk from a cross infection point of view. The fact that most of those in this study had been re-used (77%) may indicate other reasons however.

Metal trays are significantly more rigid than plastic ones and must be a more satisfactory alternative in both cost (because they can be re-used) and accuracy, So metal or special trays are to be recommended.

The prevention of cross infection in dental practice should now be routine. 157 working impressions (95.2%) showed evidence of contamination, compared to almost one-quarter of the cases in Winstanley study<sup>(5)</sup> which were obviously infected with blood, plaque, food, or other debris. In addition, 92 (55.8%) of opposing arch impressions were visibly contaminated with blood, debris, or mould growth compared to only 7.6% in Winstanley study . There is no shortage of literature on the disinfection of impressions<sup>(13-18)</sup> and the effect on putty/wash silicones which made up the minority of working impression materials in this study is negligible. Yet a number of practitioners are still routinely taking impressions without any consideration for disinfection.

However it should be considered that the criteria of estimation by smell has its pitfalls as the absence of smell did not necessary indicate lack of disinfection but presence of chemicals did indicate disinfection

It is disturbing that alginate impression material is still used in working impression in almost two thirds of the cases (67.9%). Whereas it is considered not suitable for fixed prosthodontics as a final impression and not mentioned in previous studies as an impression material used in general dental practice<sup>(2,3,8)</sup>.

In Winstanley study 6.2% working and 4.8% opposing impressions were either pulling away from the impression tray or had come away completely compared to 46% and 63% for the present study, respectively. This can only lead to a distorted impression and unsatisfactory end result. Probably the single largest cause of defective working impression in this study was the presence of indistinct crown preparation margins (59.8 % for alginate and 18.9% for silicone), which can only lead to guesswork on the part of the technician.

Effective soft tissue management is critical in this area if accurate margins are to be recorded<sup>(19)</sup>.

In order to produce a satisfactory restoration, it is necessary for the occlusion to be recorded accurately. In a large number of cases there were defects on the opposing impression (63% not properly fixed to the tray) which would have caused problems in this respect.

Finally, it should be mentioned that although the sample was selected it, most probably, represents the whole community of impression for indirect restorations in Syria. There must be some variation, of course, but only by visiting a much larger selection would this be clarified.

## Conclusions

Alginate impression material is still largely used as a final working impression. Flexible plastic trays were used for the majority of working impressions despite their known deficiencies in accuracy. Marginal discrepancies made up the largest number of individual errors in unsatisfactory working impressions. Too many impressions were sent to laboratories infected with blood or other debris, or had been re-used.

**Table 1 Assessment criteria used for each impression**

• Type of restoration required
• Type of tray used for working and opposing arch impression (Plastic disposable, metal, sectional, etc.)
• Type of impression material for working and opposing arch impressions
• Method of storage
• Presence of any occlusal record
• Evidence of disinfection (estimated by smell of chemicals)
• Presence of blood or other unwashed debris
• Fixation of impression to the tray
• The accuracy of the margins of prepared teeth on the working impression and the presence of blows, drags, or folds together with any defects on the remainder of the impression which could affect occlusal relationships
• Defects on the opposing arch impression which could lead to unsatisfactory occlusion



Figure 1 Putty and wash silicone impression with distinct finish line details.



Figure2 silicone impression pulling away from its plastic disposable tray (re-used).





Figure3 Good alginate opposing arch impression made using plastic disposable tray



Figure 4 An alginate impression well attached to the tray

**Table 2 Summary of the results of quality of working impressions**

Studied Factor	Percentage	
Type of restoration	Post crown	4.8 %
	Crowns	57.6 %
	Bridges	37.6 %
Type of tray	Plastic disposable	73.9 %
	Metal	26 %
Type of material	Silicone	32.1 %
	Alginate	67.9 %
Contamination	Absence	4.8 %
	Presence	95.2 %
Fixation of impression material to tray	Properly fixed (Silicone)	92.5 %
	Properly fixed (Alginate)	35.7 %
Accuracy	Accurate (Alginate)	40.2 %
	Accurate (Silicone)	81.1 %

**Table 3 Summary of the results of quality of opposing arch impressions**

Studied Factor	Percentage	
Type of tray	Plastic disposable	84.2 %
	Metal	15.8 %
Type of material	Alginate	100 %
Contamination	Absence	55.8 %
	Presence	44.2 %
Fixation of impression material to tray	Properly fixed	37 %
	Not properly fixed	63 %
Accuracy (Occlusal surfaces)	Accurate	86.7 %
	Not accurate	13.3 %

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تاريخ ورود البحث إلى مجلة جامعة دمشق 2009/8/26.

تاريخ قبوله للنشر 2009/12/21.