تقويم جودة أمثلة العمل الجبسية للتيجان والجسور لطلاب طب أسنان ما قبل التخرج في كلية طب الأسنان – جامعة دمشق

نبيل الحوري*

الملخص

خلفية البحث وهدفه: تتضمن صناعة التيجان والجسور مراحل عدّة مخبرية وسريرية. يجب على مخبري الأسنان أن يزود الطبيب بتعويض عالي الجودة. هدفت هذه الدراسة إلى تقويم جودة أمثلة العمل الجبسية للتيجان والجسور المستخدمة من قبل طلاب طب الأسنان.

مواد البحث وطرائقه: شملت عينة البحث ثمانية وستين مثال عمل استخدمت لصناعة تيجان وجسور لطلاب طب الأسنان اذ قيّمت جودتها حسب عدد من المعايير في قسم تعويضات الأسنان الثابتة في جامعة دمشق.

النتائج: كانت الأسنان موجودة بشكل كامل في 76.5% من الحالات المدروسة. كانت أمثلة العمل الفردية خالية من الفقاعات في 73.5% ، وحاوية على ثخانة للإسمنت في 2.9%، وغير ثابتة في 17.6%، ومقلمة تقليماً جيداً في 41.2% من الحالات. استخدم المطبق في 61.8% من الحالات.

الاستنتاج: تعدّ جودة أمثلة العمل الجبسية المقدمة لطلاب طب الأسنان ماقبل التخرج مصدر قلق إذا كانت العينة المأخوذة ممثلة لمجتمع الدراسة. لذلك يجب الانتباه بشكل أفضل للجانب المخبري خلال دراسة طلاب طب الأسنان في الجامعات.

كلمات مفتاحية: تقويم جودة، أمثلة عمل جبسية، تيجان وجسور.

* أستاذ مساعد– قسم تعويضات الأسنان الثابتة– كلية طب الأسنان– جامعة دمشق.

An Assessment of Working Casts Quality for Crown and Bridgework among Undergraduate Dental Students at Damascus Dental Faculty

Nabil Alhouri*

Abstract

Background and aim: The crown and bridge work involves clinical and laboratory stages. The dental technician should provide the dentists with high-quality work. The aim of this study was to assess the quality of working casts for crown and bridgework provided to undergraduate dental students.

Methods: Sixty eight working casts used to make crown and bridge work for undergraduate dental students were assessed for a number of factors related to quality, in Fixed Prosthodontics Department at Damascus University.

Results: The teeth were complete in 76.5% of the cases. The dies were free of bubbles in 73.5% of the cases, had die spacer in 2,9%, not stable in 17.6%, properly trimmed in 41.2% of them. The articulator was used in 61.8% of the cases.

Conclusion: Quality of working casts for crown and bridgework provided to undergraduate students is a cause for concern if the sample of cases seen in this study is typical. So, more attention should be paid to laboratory aspect during the undergraduate study in dental faculties.

Index words: working casts, die spacer, articulator.

*Associate Professor , Fixed Prosthodontics Department, Faculty of Dentistry, Damascus University.

Introduction:

Fixed Prosthodontics is a demanding speciality in Dentistry that includes many clinical and laboratory procedures. The final result depends significantly on all previous clinical and laboratory stages. This necessitates a close cooperation between dentists and technicians. Many studies have investigated this relationship and the quality of the clinical and laboratory aspects [1-6].

The focus in research for dental sciences has been largely based on new materials and techniques. However few studies have looked at the current trends and practices in dental treatment. Alhouri (1997) invistageted the quality of prosthetic treatment provided to patients attending the Faculty of Dentistry, Damascus University[7]. Similar studies can be found in different countries like Sudan, UK, Switzerland Canada, and Greece[1-6].

Reaserch has focued also on clinical stages including new materials and techniques used in impression, provisional, cementaion, etc. more than the laboratory procedures. Winstanley stated that even skillful and experienced technician would fail to produce a restoration of acceptable strength, biologic compatibility, and esthetic from an impression with error[3].

Lynch and Allen[8] examined the quality of communication between dental practitioners and dental technicians for crown and bridge in Ireland. It was concluded that, despite the extensive of various legal and ethical guidelines relating to the prescription and fabrication of fixed prostheses, more than one–half of the written instruction and master impression examined were inadequate.

The aim of this study was to investigate the laboratory work of dental technician providing services for dental students in the Faculty of dentistry, Damascus University.

Materials and methods:

The quality of the work of undergraduate students (4th year) at the Department of Fixed Prosthodontics, Faculty of Dentistry in Damascus University, was assessed between February and June 2017according to certain criteria (Table1). The researcher gathered the information using cross sectional sample about the working casts at the final stage of the prosthetic work. Sixty eight dental working casts were randomly selected out of about 700 total number of casts from undergraduate 4th year students prosthetic work. A second opinion was seeked when the researcher was not sure of the assessment, then a confirmative assessment was reached.

Results:

The sample consisted of 68 working casts (Table 2). The teeth were present (complete) in 76.5% of the cases. The dies were free of bubbles in 73.5% of all the cases. The remaining had small or large bubble (Figure1).

Figure 1: A bubble is present at the buccal surface of lower first premolar abutment

Only two dies out of 68 had die spacer (2,9%) (Figure2). The dies were not stable in 17.6% of the cases. Only 41.2% of the dies were properly trimmed (Figure 3). The articulator was used in 61.8% of the cases, however the need for articulation was present in 64.7% of the cases. Thus the articulator was not used in two cases where it should have been used (Figure 3).

Figure 2: Die spacer is painted clearly

Figure 3: The dies were not properly trimmed. In addition, an Articulator should have been used in this case.

Table 1: Criteria used to assess the working casts of the sample

Criteria	Response	Explanation
Does the working cast have all the teeth present?	Yes / No	When full arch tray was used but not all the teeth are present
Does the die have bubbles?	Yes / No	Large bubble is considered a reason for remake of cast
Is die spacer present?	Yes / No	Die spacer should be applied clearly
Is there any movement in the die?	Yes / No	The die should be stable
Has the die been trimmed properly?	Yes / No	Proper trimming is important for proper contour
Have the working cast and its opposing been articulated ?	Yes / No	Has an articulator been used?
Was there any need for articulation?	Yes / No	Not all cases need articulator

Table 2: The results of the assessment of working casts

Frequency (%)		Quality point
No	Yes	
16 (23.5)	52 (76.5)	Does the working cast have all the teeth present?
50 (73.5)	18 (26.5)	Does the die have bubbles?
66 (97.1)	2 (2.9)	Is die spacer present?
56 (82.4)	12 (17.6)	Is there any movement in the die?
40 (58.8)	28 (41.2)	Has the die been trimmed properly?
26 (38.2)	42 (61.8)	Have the working cast and its opposing been articulated ?
24 (35.3)	44 (64.7)	Was there any need for articulation?

Discussion:

This study investigated the laboratory work of crowns and bridges carried out by undergraduate students during their course in Faculty of Dentistry, Damascus University. Students rely on their personal contacts to find a dental technician that provides them with good quality. However, students should be able to assess the final work (fixed prosthesis) before proceeding to the next clinical stage. The working casts were investigated for several points, that occurred during the laboratory stage of preparing the cast and dies, which will affect the quality of the treatment provided to patients.

In nearly one quarter (23.5%) of the casts, the teeth were not complete; either the working impression was not complete or the cast was trimmed/ sectioned by the dental technician because there was a defect in the cast. This may affect the proper articulation of the working casts and their opposing casts. Rudd et al (1970) stated that in order to provide the most accurate articulation, it should normally represent the entire arch[9].

Rosenstiel mentioned that all surfaces of any teeth involved in anterior guidance and the occlusal surfaces of all unprepared teeth must allow for precise articulation of the opposing casts [10].

The dies had bubbles in 26.5% of the cases. Rosenstiel stated that the die for the fixed restoration must reproduce the prepared tooth exactly and no bubbles or voids can be accepted. Large bubbles could affect the complete fit of the restoration on its abutment.

Only two dies out of 68 had die spacer (2,9%). Die spacer was defined[11] as an agent applied to a die to provide space for the luting agent in the finished casting. Rosenstiel explained that **t**his material is applied to the die to increase the cement space between axial walls of the prepared tooth and the restoration. It is formulated to maintain constant thickness when painted on the die. However, it should not coat the entire preparation. For adequate marginal

adaptation, a band of about 1 mm immediately adjacent to the preparation margin must be left unpainted. The ideal dimension for the cement space has been suggested at 20 to 40 um for each wall. In addition, many studies have emphasised the importance of applying die spacer[12], and the number of coats that should be applied.[13,14]

Die spacing was the most suitable method to compensate for casting variables and to ensure improved marginal adaptation while also increasing retention by 25%[13]. Although most common die spacers are resins. Although proprietary paint-on liquids, model paint, colored nail polish, and thermoplastic polymers dissolved in volatile solvents are also used[15]. Such spacers are applied in several coats to within 0.5 mm of the preparation finish line to provide relief for the cement luting agent and ensure complete seating of an otherwise precisely fitting casting or coping.

In this study, it can be anticipated that the casting will not seat properly during cementation because of hydraulic pressure that develops when the viscous mass of luting agent cannot escape through the narrow gap between crown and preparation as the restoration is seated.

The dies were not stable in 17.6% of the cases. Rosenstiel [10] emphasised that precise relocation of the die in the definitive cast is crucial and is usually accomplished with brass pins or dowels. Studies since the 1965 searched for techniques to make dies return to their exact original positions[16].

Only 41.2% of the dies were properly trimmed to have the same cervical contour as the tooth. When trimming a die, the original contour of the tooth structure below the margin must be preserved. Overtrimming will result in overcontoured restorations. Excessive trimming leads to a bulky crown, because the trimmed die acts as a guide to gingival contour when the restoration is being waxed[10]. Shillingburg [17] stated that the contour of the die apical to the finish line should approximate that of the root to facilitate good

axial contours in the finished restoration. However in this study, the trimming of the dies was minimal. It can be anticipated that the contour of the final restorations of more than half of them is compromised.

The articulator was not used in two cases where it should have been used. However, articulators were used in 61.8% of the cases. The 4th year students start their clinical work at the Department of Prosthodontics by treating patients who need simple fixed prosthodontics work. This includes single full crown or simple short span bridge. The conformative approach is used in most of the cases. Conformative approach was defined as the provision of restorations 'in harmony with the existing jaw relationships'.[18] In practice this means that the occlusion of the new restoration is provided in such a way that the occlusal contacts of the other teeth remain unaltered.[19]

It is possible to provide a restoration to the conformative approach when the patient has an ideal occlusion, or the patient does not have an ideal occlusion, but that the removal of the existing occluding surface of the tooth to be restored does not mean an inevitable change in the patient's centric occlusion or anterior guidance.[20]

On contrary, Smith [21] explained that hand-held models are not usually satisfactory. The most common problem is that posterior restorations are made high and are not detected because it is very difficult to see the tiny spaces between pairs of opposing teeth adjacent to the restoration.

Smith emphasized that it is much better to ask the technician to use an appropriate articulator. This will often save clinical time and patient respect (both more valuable than the laboratory time).

He added that simple-hinge articulator is adequate when there are sufficient unprepared intercuspating teeth and the restoration is to be made occluding in centric occlusion. This applies for the work carried out by the students in this study.

The study included many criteria that were easy to detect such as the presence of all teeth in the working casts, die spacer, obvious bubbles or instability of the die and using the articulator. However the difficulty of evaluating the dies for proper trimming could be a limitation of this study.

Conclusion

Within the limits of this study it can be concluded that the laboratory work of crowns and bridges carried out by undergraduate students is far from ideal. Die bubbles and die spacer were obvious mistakes. Student should have the knowledge to assess the final prostheses and then to accept or reject them before proceeding to the final cementation.

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