



Improving Decision-making in Restorations: Evaluation of Impressions and Working Casts

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ABSTRACT The success of a crown greatly relies on its margin. An ill-fitted crown with an open margin will be susceptible to leakage and recurrent decay. If it remains undetected, it will eventually cause serious problems. This report looks at the finish line consistency of 73 “clinically acceptable” impressions made by dental students and working casts poured in the laboratory section. Findings show a number of possible inaccuracies in preparations, impressions, or a combination of both.

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Marginal integrity is an important element in evaluating a restoration; however, there is no general agreement about the definition of a clinically acceptable margin. A good quality impression is a prerequisite to the fabrication of a well-fitting laboratory-made restoration.¹ With regard to the evaluation of preparations, Rosentiel, Land, and Fujimoto indicated, “the impression may still be acceptable when a small defect is present in noncritical area (e.g., away from the margin of a prepared tooth). Careful judgment must be exercised.”²

When making an impression of a crown, capturing the margin becomes the most significant part when evaluating whether an impression is acceptable or not. The restoration can survive in the biological environment of the oral cavity only if the margins are closely adapted to the cavosurface finish line of the preparation.³ When the margins of a cast restora-

tion are to be duplicated from a working cast, an essential element is ensuring the presence of a detectable and well-defined finish line on a tooth prior to making an impression. One of the most frustrating problems associated with impression-taking is the fact that an impression may look perfect but is actually distorted. Much time is wasted in making the crown, scheduling the patient, trying to seat the crown, and remaking the impression.⁴

Methodology

Student cases for crowns and bridges are evaluated through two steps of quality control at the University of the Pacific, Arthur A. Dugoni School of Dentistry. An impression taken by the students is initially evaluated by the faculty and students in the clinic. Additionally, the poured-up working casts are evaluated in the lab to assure the quality of the prostheses to be delivered to the patients.

The intent of this study was specifically to reevaluate the poured-up casts and

obtain rationales or a line of reasoning for unacceptable impressions and working casts. Identifying the most common problems found in impressions, that taken by dental students in restorative procedures.

When making impressions, students are challenged to produce clinically acceptable impressions. In some cases, several

attempts are made prior to producing an acceptable impression. Only one impression maybe submitted to the lab for fabrication of a crown. In this study, 73 impressions were evaluated. Data were collected randomly from the cases submitted by second- and third-year dental students. The assessment included 292

surfaces of 73 tooth preparations for various cast restorations. The variety finish line designs included chamfer and 90- or 120-degree porcelain shoulders. All 73 impressions had been examined microscopically by clinic floor faculty and passed as “clinically acceptable,” using a high-power stereoscope X 10 model BM40455. In the

TABLE 1

Classification of Errors in the Margins of the Prep on the Study Casts and on the Impressions

Finish Line of Prep	Type of Error	Description
On the working cast	None existing or light	Finish line fades from the prep to the tooth; there is no margin (FIGURE 5) or it is too light (FIGURE 1).
	Not continuous	Finish line does not go all around the tooth; it looks like a zigzag or stepped margin (FIGURE 2).
	Double or several finish lines	There are two or several finish lines on top of each other (FIGURE 4).
	Rough finish line	Finish line has many scratches or nicks from the bur; it is not a sharp or well-defined line (FIGURES 6, 7).
	Fuzzy finish line	It is not possible to tell the difference between the finish line and the prep (FIGURE 5).
	Finish line not appropriate	Finish line design not correct for the requested type of prosthesis (FIGURE 6).
On the impression	Bubble on finish line	Small bubbles are easily identified; large bubbles on the finish line are harder to identify (FIGURE 8).
	Folding of impression	This occurs when there is saliva or too much moisture in the sulcus. Moisture on finish line.
	Tear	This occurs if the impression is removed prior to complete setting or if the impression cuts in the cord.
	Cord on the finish line	An impression of the cord has been picked up with the impression and is on or next to the finish line (FIGURE 3).
	Distortion of impression	Separation of material from the tray due to inadequate tray adhesive. Different setting time of light/heavy body impression material.

laboratory, a total of 29 percent of these cases were rejected and they were not accepted for cast fabrication. The same high-powered scope was used for reevaluation; the working casts and working dies were evaluated in a laboratory environment as opposed to evaluating impressions and preparations in patient's mouth. Establishing guidelines and requirements for an acceptable working die from the

laboratory point of view will be beneficial for practitioners to look for potential errors early on. At the same time, calibration of dentists, faculty, lab technicians, and students will reduce the number of remakes. It should also be noted that when assessing a case, the operating environment in clinic is more challenging than the laboratory environment. Evaluation of the finish line on a die under a high-power

scope is easier than evaluating a preparation in the mouth or an impression.

Summary

The outcome showed inaccuracies could occur in three categories: 1) errors in the preparations alone; 2) errors in the impressions alone; and 3) errors in both preparations and impressions. Results included: 18 percent of the errors were on finish lines of the prepared teeth; 8 percent of the errors were in the impressions; and 4 percent were in both the impression and the prepared tooth. Seventy percent of the die stones were determined acceptable for fabrication of the requested prostheses.

In general, flaws in cast restorations could be visible or invisible flaws. Most visible flaws can be identified by the technician. Invisible flaws are dis-



FIGURE 1. Light finish line.



FIGURE 2. Finish line not continuous.



FIGURE 3. Cord on finish line.



FIGURE 4. Double finish line.



FIGURE 5. Unidentifiable finish line.



FIGURE 6. Preparation and impression unacceptable.



FIGURE 7. Rough finish line.

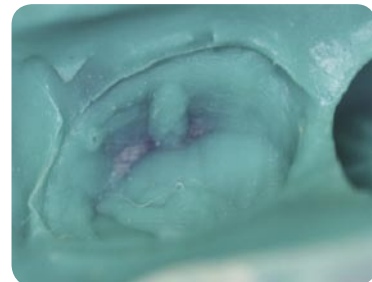


FIGURE 8. Bubble on impression.

covered at the time of placement of the restoration. The most common visible flaw is the lack of a visible finish line. Such defects are usually the result of inadequate gingival management.⁵

Results

The results of this study are shown in **TABLE 1** and have been divided into two categories: evaluation of the finish lines of the preparations on the casts; and on the impressions. The classification of errors (**TABLE 1**) is based on the cases evaluated and visible flaws.

Discussion

The scope of this study was limited to the evaluation of the margins of the preparations and the impressions by dental students. It is necessary to point out there could be other problems, which might not be related to the margins and that might cause a case to be rejected. These problems might include errors in prescription, errors with casts, errors in mounting, errors in the articulator itself, and others. ■■■■

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