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Impression Making and Lab Work Authorization Forms in Fixed Prosthodontics: A Preclinical Exercise

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Abstract

Introduction: Making a final impression using a custom tray for fixed prosthodontics is a widely accepted procedure that is taught in many dental schools. As such, achieving competency in impression making and lab communication is a new Commission on Dental Accreditation curriculum requirement for all dental schools in the US. **Methods:** This resource presents an instructional slide show on the clinical steps required in fabricating a custom tray using a visible light-cured resin, making a successful impression, and writing a work authorization form for the fabrication of a fixed dental prosthesis. The presentation also contains a brief overview of alternative techniques and materials used as well as basic points for self-evaluation for the custom tray and the final impression. This activity was conducted as a small-group team-based learning exercise in a preclinical setting, where a self-assessment form was provided for students to evaluate their work. **Results:** Examiners indicated that students who completed this exercise had a deeper understanding of the sequencing of steps involved in the construction of a fixed partial denture as well as better lab communication skills compared to students from previous classes who did not participate in the exercise. **Discussion:** The preclinical setting provided students with a relaxed atmosphere for fabricating a custom tray using visible light-curing material. This exercise is part of a larger preclinical exercise that takes students through all the steps involved in the fabrication of a fixed dental prosthesis, from impression making to the evaluation of the framework made by the lab.

Keywords

Final Impression, Custom Tray, Self-Assessment, Commission on Dental Accreditation Standards, Lab Work Authorization, Fixed Prosthodontics

Appendices

- A. Impression Making in Fixed Prosthodontics.pdf
- B. Final Exam and Answer Key .pdf
- C. Lab Authorization Forms .docx
- D. Self-Evaluation - Tray Fabrication.pdf
- E. Self-Evaluation - Lab Authorization.pdf
- F. Self-Evaluation - Impression .pdf

All appendices are peer reviewed as integral parts of the Original Publication.

Educational Objectives

By the end of the course, students should be able to:

1. Understand the different techniques and materials for making a fixed prosthodontics final impression.
2. Demonstrate the skills needed to fabricate a custom tray and to make a final impression.
3. Self-evaluate the accuracy of the custom tray for final impression.
4. Self-evaluate the accuracy of the final impression.
5. Demonstrate competency in writing a lab work authorization form and communicating with the dental lab.

Introduction

Based on the most recent Commission on Dental Accreditation standards, especially standard 2-23 g requiring competency in lab communication,¹ this resource was created to correlate steps that are usually taught as separate modules into a single two-part preclinical exercise. This resource aims to enhance student skills in fabricating a custom tray for a final fixed prosthodontic impression and then self-assessing the final impression and the student's communication with the lab. It also provides an overview of the alternative techniques for impression making. This resource is part of the Fixed Prosthodontics II course

that is taught to sophomore students at the University of Florida, College of Dentistry in the spring semester.

Existing literature discusses the steps involved in fabricating a fixed dental prosthesis in clinical and preclinical settings for dental practitioners. The literature includes separate modules reviewing custom tray design,²⁻⁸ impression materials,⁹⁻¹⁵ lab communication,¹⁶⁻¹⁸ and the evaluation of the work received from the lab. Solomon created a preclinical exercise on custom tray design and fabrication that is available on MedEdPORTAL.³ Christensen⁹ and Farah and Powers¹⁰ discussed impression materials and impression making techniques. Other authors have presented comprehensive studies on lab communication, guidelines for work authorization forms, and national surveys independent from the initial steps of impression making.¹⁶⁻¹⁸ However, although comprehensive reviews of the technique, these works do not directly relate the initial steps of impression making to the final outcomes of the product returned from the lab in a manner suitable for preclinical teaching. For dental students, there is a need to complete a comprehensive exercise that will provide the full real-life experience of going through all steps from impression making to evaluating the impression, gathering records for the lab procedure, writing a lab work authorization form, and receiving and evaluating work returned from the lab. This exercise, introduced early enough in the curriculum, can help students connect all these steps together for a deeper and more comprehensive understanding of the full series of steps that conclude with the fabrication of the dental prosthesis. It also provides them with a deeper understanding of how every step can critically affect the quality of the final product.

The presentation also includes an overview of alternative techniques and materials available for impression making and provides the basic points for self-evaluation of the tray construction and impression making. Although competency in writing lab work authorization forms and lab communication is evaluated at a later stage in the curriculum, this resource provides students with guidelines for lab communication and laboratory work authorization writing on the same form currently used in the University of Florida, College of Dentistry clinics.

After the preclinical exercise is complete, the case is sent to the lab for fabrication of a fixed partial denture framework from a nonprecious technique alloy. According to the student's proficiency in submitting work to the lab, the student will evaluate the work received back from the lab. Based upon budgetary resources, the course director can elect to teach this part as a separate exercise or as a part of the complete exercise that also includes fabrication of a framework for every case sent to the lab, or send only a limited number of cases to the lab for a limited number of frameworks. The frameworks are also used in our fit adjustment and precementation evaluation exercise, which we intend to make available in another module eventually.

Methods

The target audience for this exercise is sophomore students who have completed their first course in fixed prosthodontics and are currently taking their second course in it. In the first fixed prosthodontics course, students should have reviewed the materials for final impressions, studied the technique (but not yet performed a physical review of the technique), and observed an impression demonstration. We integrate this exercise into Fixed Prosthodontics II, our preclinical course for sophomore students.

The presentation (Appendix A) contains 47 slides in a two-slides-per-page PDF format that can be easily printed as a step-by-step manual or handout. The presentation covers the following points:

- A brief review of the ideal requirements for impression materials used for making a final impression for a fixed dental prosthesis.
- A brief overview of the materials used for making final impressions.
- Advantages of a custom tray and why one is necessary.
- Armamentarium needed for fabrication of a custom tray in the preclinical exercise.
- Fabrication procedure steps discussed in detail.
- Rationale for every procedural step.

- Curing and finishing steps for the tray material.
- Criteria for evaluating the tray.
- General clinical considerations for final impression making.
- Steps for impression making using the tray.
- Acceptable alternative techniques for impression making.
- Evaluation of the final impression.
- Making a bite registration.
- Writing a lab work authorization and lab communication.

Every student is asked to fabricate a custom tray on the diagnostic cast provided using the guidelines specified in the presentation. Small groups of two to four students, based on available resources, work together to self-evaluate the trays (Appendices D & F) and select the best tray out of the four fabricated. The group's decision is verified by supervising faculty. The student group works as a team, making one impression using the selected tray. Students work as a group to self-assess the impression based on the criteria listed in the presentation. Supervising faculty are available during the exercise to coach the students throughout the procedure of impression making following the guidelines in the manual. The final impression is evaluated based on accurate reproduction of details, margins, and the other criteria in the manual.

The lab communication portion is conducted by having each student write a lab work authorization form (Appendix C). The forms are then critiqued by faculty for the clarity of the instructions to the lab. The forms are evaluated by comparing them to a sample written by the course director and presented to the students in slides 43-46 in the presentation. Students can self-evaluate the form as well (Appendix E). The best lab work authorization of the four is sent to the lab with a bite record and opposing cast. Guidelines in the manual are used to evaluate the lab communication. Prior to sending the work package to the lab, it is reviewed by the quality assurance dental technician in the school's central lab. The quality assurance technician evaluates the clarity of the information on the lab authorization form and the overall quality of all the work submitted.

The exercise culminates in a written assessment (Appendix B) composed of 10 multiple-choice questions given as a quiz or alternatively included as a part of the final exam. Feedback and corrections should be made available to the students. The course director determines grade distribution and what the passing grade is according to the criteria outlined in the course syllabus. At the University of Florida, this exercise is evaluated with a pass/fail grade depending on written exam performance and project completion. The faculty work closely with the students to ensure that all complete the exercise successfully. The project grading form is only used for determining which tray will be used for impression making.

Required Materials and Armamentarium

In addition to the standard equipment provided in a prosthodontic preclinical lab, the following items are necessary for the implementation of this course:

- Typodont (Kilgore, Nissin, etc.).
- Diagnostic cast (duplicate).
- Ruler and pencil.
- Baseplate wax.
- Scalpel handle and blade.
- Tinfoil or aluminum foil.
- Separating medium.
- Visible light-cure custom tray material.
- Light-curing unit (we use the Dentsply Trubyte Triad 2000).
- Acrylic resin carbide burs and handpiece.
- Bunsen burner.

In previous years of implementation, the availability of equipment was based upon grouping every four students to form a small team. One impression material dispenser was available for every two groups, and

several injection tips were available for the groups. Students in every team evaluated the trays made and selected the best one for the impression. Thus, the implementation of the exercise is contingent upon having budgetary resources to cover the costs for custom tray and impression materials and dental lab fees. Due to the need for close supervision and one-on-one tutoring, a faculty-to-student group ratio of one to four or less is highly recommended. Using senior students as teaching assistants contributed positively to the preclinical exercise.

Results

Upon completion of the exercise, cases from every student group were sent to the lab for fabrication of metal frameworks. After 2 weeks, the frameworks were returned for metal framework try-in. Note that the framework try-in and fit evaluation and adjustments are not discussed in this exercise but may be added later as a separate module.

After the successful completion of the Fixed Prosthodontics II course, our students have to pass a clinic entry exam prior to having patients assigned in the clinics. Preliminary comments from the examiners showed that students who completed this exercise had a deeper understanding of the sequencing of steps involved in a fixed partial denture construction and better lab communication skills compared to students from previous classes who did not participate in this exercise.

Students entering the clinics were advised to review the module prior to making their first impression. Students who followed this advice reported a smoother and more successful experience in making their first final impression. No separate student evaluations were made for this specific exercise; however, comments were submitted as part of the overall course evaluation. The exercise was well received by the students, and all comments were positive.

Discussion

The preclinical setting provided students with a relaxed atmosphere for fabricating a custom tray using visible light-curing material. The close supervision from the faculty helped the students understand the role of every component involved in the tray fabrication process. Some students who skipped steps, such as applying the aluminum foil or lubricant, had the opportunity to understand the consequences of taking such shortcuts and how that impacts the quality of the final product. The students also learned how to evaluate the success of an impression by evaluating the accuracy of the margins recorded using the criteria specified in the presentation. When unsuccessful impressions were made, the students were coached by faculty through all steps. The step of injecting the light body material to the margins of the preparation was considered the most difficult by the students. This step was closely supervised by faculty until a successful impression was made. This faculty coaching provided the students with a deeper understanding of all the steps required for making a clinically successful impression.

The exercise used the same lab authorization form as the University of Florida, College of Dentistry clinics, which made the students more familiar with the form. The clinical instructor's comments showed that students had improved skills in writing the forms and were better organized in submitting all required materials to the labs. The lab fabricated a metal framework for a three-unit porcelain fused to metal bridge fixed dental prosthesis using a low-fusing technique alloy for the purpose of this exercise only, and porcelain was not applied to the frameworks. The frameworks were returned to the students for a framework fit evaluation and adjustment exercise. We plan to discuss that exercise in a separate module in the future. Combining these two exercises together provided the students with a real-life, hands-on clinical experience for very important clinical procedures.

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Ethical Approval

Reported as not applicable.

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