



## Undergraduate pupils clinical accomplishments in clinical fixed prosthodontic course (SDS-543) – Case series

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### Abstract

*Clinical fixed prosthodontics includes treatment options like crown and fixed partial denture placement in various Kennedy class 3 or 4 partially edentulous situations. While it is important for an undergraduate student to learn basic treatment options, it is also important to make him think differently while teaching clinical work with dental patients. We present multiple cases treated by our undergraduate students during the course of completing their first semester curriculum. Various aesthetic characterizations of dental porcelain, accurate shade matching, correct provisional restorations and few complex fixed partial denture treatment cases have been presented. Exposure of an undergraduate student to treat his cases uniquely, adds to his confidence and understanding of the subject. Conventional monotonous approach to every case does not instill curiosity in students.*

*Keywords: fixed partial denture, dental porcelain, fixed movable bridge, staining, metal ceramic.*

### Introduction

The ministry of education in the Kingdom of Saudi Arabia, is operating five different universities in the southern province of the kingdom. Among these five universities, the Jazan province gained more importance after being declared as a future economic city of the kingdom. The college of dentistry, initiated its study plan in the year 2010 and is now ranked as one of the upcoming top dental colleges in the kingdom. The bachelors program consists of a study period of five years, which is followed by a one year compulsory rotating internship.<sup>1</sup> The main goal of providing outstanding education, research and community health care is compounded by the increased demand of health care among the general population. With a

massive infrastructure of 285 segregated dental clinics, 100 phantom heads simulation laboratory, two prosthetic and production laboratories,<sup>1</sup> the division of fixed prosthodontics within the department of prosthetic dental sciences conducts various preclinical and clinical courses to prepare its students with necessary skills for their professional future.

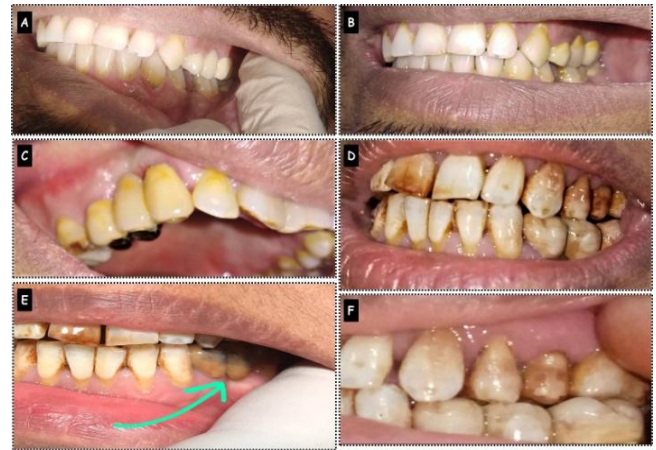
The poor personal dental care among the general population in this region exposes dental students in the division to extreme challenges in restoring/replacing natural teeth. The success of such restorations relies on students' ability to perform high standard treatments that is based on sound knowledge of basic sciences.<sup>2</sup> Under experienced staff supervision, the students are also taught to

effectively communicate the requirements of the restoration to the laboratory technician using crystal clear written instructions.<sup>3</sup> Communication between the students and the laboratory technician is mandatory to achieve the planned restoration. This article in the form of a case series is intended to present the clinical endeavours of undergraduate students in treating partially edentulous patients with fixed partial denture. Since the treatment done is the consolidated clinical outcome of the 6 month period (August 2019 to January 2020 – First semester), detailed discussion of each case has been restricted while each case is focused on highlighting the necessary communication skills of students and clinical/ laboratory staff.

### Case series presentations

#### Series 1: Porcelain Characterization

**Case 1(Fig 1A, B):** Male patient presented with a Kennedy class 3 partially edentulous arch on the maxillary left side with second premolar missing. Anterior maxillary teeth, excluding canine had a basic hue of white color, while canine had a basic hue of yellow color with increased saturation of yellow in the cervical region (**Fig 1A**). The shade chart provided to the dental technician was divided into two different sections. The shade for the first maxillary premolar was closely matched to central and lateral incisor, while shade for premolar and molar were closely matched to the three shades present on the incisal third of left canine (chart diagram with 9 section shades). Occlusal surfaces were fabricated in metal while the buccal surface of all posterior teeth had a buccal facing. The technician was instructed to put dentin (body) of lower value in the cervical region while the incisal and the middle third, maximum bulk was to be built up with enamel of a higher value. After porcelain trial, the fixed partial denture was temporarily cemented and the shade evaluation was done. Since the entire restoration had a higher value, the prosthesis was quite obvious to the naked eye whenever the patient smiled. A high resolution clinical photograph of the cervical area was provided to the dental technician who, after application of the proper stain (Chrome Yellow)

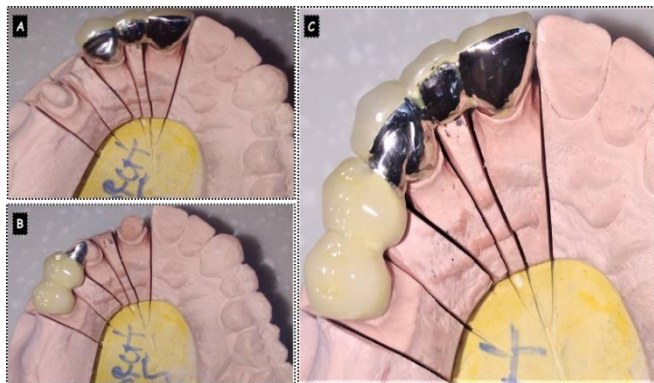


**Figure 1: (A) Posterior FPD before staining (B) Posterior bridge after staining (C) Cervical diffuse shade gradation (D, E, F) Mandibular posterior restorations with diffuse stains using different background techniques.**

using the VITA stain kit (Vita-Ceramco, Chrom L Lab Porcelain Stain Kit) applied in two different concentrations enabled shade matching with the canine that progressed having lower value from anterior to posterior region (**Fig 1B**).

**Case 2 (Fig 1C):** A young male patient reported with a Kennedy class 3 partially edentulous situation on the right side of the maxillary arch with first premolar missing. The challenging part of esthetic shade selection was matching the adjacent left maxillary lateral incisor, which had two basic hues (yellow and white) equally and diffusely distributed on its surface. The prosthetic restoration was satisfactorily restored by matching the basic hue and values of the lateral incisor for left canine retainer and corresponding hue and value of maxillary left first molar for posterior retainer. Gradual reduction in hue and value was done starting from anterior to posterior region on the Vita 3D shade guide tabs. While the overall value of each tooth was decreased from anterior to posterior region, the corresponding hue was increased from anterior to posterior and occlusal to cervical regions.

**Case 3 (Fig 1 D, E, F):** An adult female patient was assigned to a student for the replacement of a mandibular left second premolar in anatural dentition which was characteristically stained intrinsically. The intrinsic stains on the natural teeth differed in intensity, location and character. A thorough oral prophylaxis was done to remove the effects of extrinsic stains. To meet the aesthetic challenge two approaches were employed. One was



**Figure 2:** (A) Mesial portion of fixed, movable bridge (B) Distal portion of FMB (C) Entire fixed, movable bridge assembly with a semi precision connector

to use a dark background over which light colored spots were incorporated and the other was using a light background on which dark colored spots were placed. The first approach did not produce desired esthetic results (**Fig 1 E**) while the second approach produced excellent results. The basic shade that was selected was of higher value on which lower value stains were incorporated.

### Series 2: Fixed movable bridge

**Case 4 (Fig 2A, B, C):** A complex partial edentulous situation is that of a pier abutment in which a prospective abutment tooth is surrounded on either side by partially edentulous arches. A canine is one of the most important tooth in natural dentition in term of its role in protecting occlusion. A partial edentulous situation where a canine is a pier abutment should be carefully and conservatively planned. The presented case also shows Kennedy class 2 partial edentulous situation making it a future candidate to receive a cast partial denture. One of the drawbacks in this case was that the planning of the cast partial denture was not available at the time of fixed partial denture treatment. However, to accommodate future partial denture treatment, a cement that allows removal of the bridge in the near future was used during final cementation. The bridge design that was used for treating this case was that of a fixed, movable bridge using a custom made semi precision attachment (modified cingulum rest). The anterior most component was first fabricated and cemented in place (**Fig 2 A**) followed by definitive impression of the cemented prosthesis. The second component was fabricated and cemented on only one abutment

since the cingulum rest was supported by previously prepared rest seat.

### Series 3: Miscellenous cases

**Case 5 (Fig 3A):** A young male patient with a dark complexion had a Kennedy class 4 partially edentulous situation in the maxillary arch with two central incisors missing. The size of the lateral incisors on either side and the current occlusal status permitted to use the two lateral incisors to support a four unit fixed partial denture to replace the missing central incisors. However, the shade matching was considered to be challenging since the distribution of shades in the opposing arch was not uniform. After selecting the value for each tooth in natural light, the distribution of various shades on the shade chart was customized rather than keeping it conventional. Distribution of dentin and enamel was sketched on the charts and the technician was instructed to build up the porcelain for each tooth as indicated. Shade matching was achieved by instructing the laboratory technician the areas from where the enamel needs to be added during porcelain build up.

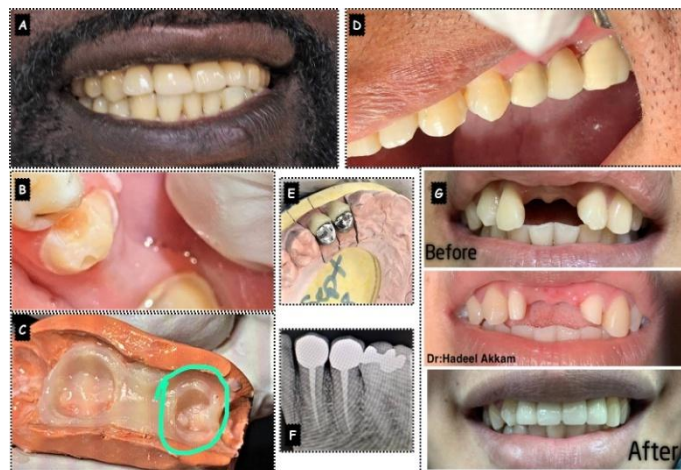
**Case 6 (Fig 3 B, C):** The size of the natural teeth in the female gender in this region is clinically found to be small which compromises the retention of fixed partial denture in such cases. Moreover, the presence of existing caries further reduces the tooth surface area, thus hampering retention of the retainers. One such case of a fixed partial denture in relation to missing mandibular right first molar presented with both features, small sized crown and caries. The tooth preparation was modified to include a box preparation on both sides. Flaring of the preparation from gingival seat to occlusal surface can be observed in the temporary restoration (**Fig 3 C**).

**Case 7 (Fig 3B, C):** Temporary restorative materials in the recent times have shifted from self cure acrylic resin to light cure resin. Although composites are considered to be more esthetic than self cure resin, the students must understand that these advantages are contextual to each product. Conventional composites are esthetic when different shades are combined for restoration, which does not hold true for composites that are used to fabricate

provisional restorations in crown and bridge. Moreover composites lack necessary strength, especially when used in posterior temporary bridges. A temporary bridge fabricated out of self cure denture acrylic (Unifast III, GC Europe) (Fig 3 D) can be highly esthetic provided the temporary restoration is properly finished and polished.

**Case 8 (Fig 3 E, F):** A female patient needed two crowns for her endodontically treated maxillary right first and second premolars. The patient wanted the teeth to look natural which, according to her meant that the color of the whole tooth should be same as that of a natural tooth including the occlusal surfaces of artificial teeth. After patient education and motivation, patient was given two porcelain fused to metal crowns (buccal facing) for both crowns. With metal on occlusal, lingual and proximal surfaces we increase the longevity of abutment and increased masticatory efficiency. Fused Porcelain on occlusal surfaces compromises occlusion (porcelain slumping during firing eliminates planned occlusal contacts), compromises crown retention (more occlusal reduction required), while resulting in over contoured lingual and proximal margins that are a potential threat to the periodontium. A radiograph of the two crowns (Fig 3 F) demonstrates margin adaptation proximally without causing overcontouring.

**Case 9 (Fig 3 G):** A non saudi adult female patient was treated by an undergraduate student which presented with a kennedy class 4 partial edentulous situation. The size of the adjacent lateral incisors were large and supraerupted beyond the incisal plane, which posed an esthetic challenge in esthetic rehabilitation. After thorough radiographic evaluation the treatment plan decided was to involve two lateral incisors only since there was increased overjet that provided occlusal protection to use of lateral incisors as abutments. Although shade selection was not challenging, the level of placing the incisal edges for lateral incisors was definitely thought provoking. Incisal reduction of lateral incisors was done more than conventional to allow the adequate thickness of porcelain at incisal edge. A conventional incisal reduction of 2 mm at



**Figure 3: (A) Maxillary anterior FPD (B,C) Proximal box preparation (D) Temporary FPD (E,F) Well contoured individual crowns (G) Four unit anterior FPD**

the incisal edges would have resulted in decreased thickness of porcelain incisally or the level of lateral incisor would have been same as that of the central incisor which would have resulted in unaesthetic restoration.

### Discussion

A series of clinical cases done by the present 5<sup>th</sup> year undergraduate dental students at college of dentistry, Jazan university during their clinical course of clinical fixed prosthodontics has been presented. The cases have been done in the first semester between September 2019 and January 2020. While most of the cases are associated with the shade matching for dental porcelain restorations, other cases range from simple to complex treatments. One of the important outcomes of dental education in providing clinical health care is to impart self confidence in students.<sup>4</sup> Since times ahead are going to be competitive for students, raising the bar of treatments becomes imperative for all teachers. Competence on the other hand represents an individual's capability which is based on ones previous experiences about a particular task.<sup>5</sup> Confidence and competence are not necessarily related to each other, as a student may have the skills, but their opinion of their abilities may not give them the necessary confidence to carry out a particular clinical procedure.<sup>6</sup> Fulfilling esthetic requirements, especially in porcelain restorations is one such area where students need to

understand that they may not achieve the expected results which may even be due to a minor neglect of a clinical procedure.

The important parameter in selecting a particular shade is its value which should always be performed in natural light. Light sources present inside a dental clinic (fluorescent and/or incandescent) are not good to match the value of a shade. All the shades selected in the above cases have been done outside the clinic in areas that match the given recommendations. Another important parameter is the artful communication and instructions given to the laboratory technician. A set of 9 different or same shades was given for all restorations and the extent of the enamel and dentin application was customized for each individual case. Students must also remember that confidence is directly proportional to understanding followed by practice, therefore, while learning the correct procedure they should be careful not to neglect even a small clinical step during the course of a dental treatment.

### Conclusion

Wherever possible, students should be exposed to result based clinical procedures. An academician must remember that whatever is done within the guidelines of scientific principles, he must put his efforts to achieve the best possible results for patients as well as for students.

### Acknowledgements

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