

Do's and Don'ts of Porcelain Laminate Veneers



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Intended Audience: Dentists, Dental Hygienists, Dental Assistants, Dental Students, Dental Hygiene Students, Dental Assistant Students

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Disclaimer: Participants must always be aware of the hazards of using limited knowledge in integrating new techniques or procedures into their practice. Only sound evidence-based dentistry should be used in patient therapy.

Conflict of Interest Disclosure Statement

- Dr. Anderson has done consulting work for P&G.
- Dr. Kugel reports no conflicts of interest associated with this course.
- Dr. Sharma reports no conflicts of interest associated with this course.

Introduction

This course will give guidelines on how to make esthetic changes for teeth that are discolored, worn, chipped, malformed or misaligned. Porcelain veneers are considered to be strong and to have great esthetics and a long-term prognosis.

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Overview

Porcelain veneers are routinely used to make esthetic changes for teeth that are discolored, worn, chipped, malformed or misaligned. Porcelain veneers are considered to be strong and to have great esthetics and a long-term prognosis. This course will give guidelines to achieve these results by explaining case selection, treatment plan and procedures step-by-step.

Learning Objectives

Upon completion of this course, the dental professional should be able to:

- Understand the philosophy of esthetic dentistry.
- Understand the indications and contraindications of veneers.
- Learn teeth preparation for veneers, temporization and cementation to achieve predictable results.

Introduction

Recent public exposure via the media to various kinds of esthetic dentistry procedures has increased demand for veneers. In past years, full coverage restorations were often used to correct minor defects or to mask discoloration. However, the more conservative concept of veneering teeth has been around for some time.

In 1928, Charles Pincus introduced the porcelain "Hollywood Bridge." These veneers were fabricated for actors and used only in front of the camera. The actors were instructed not to

wear the veneers while eating since the veneers were not bonded. Nine years later, in 1937, Pincus also fabricated acrylic veneers. These veneers were retained by denture adhesive, but failed because there was no adhesion to the teeth.¹ In 1955, Michael Buonocore introduced enamel etching and in 1962, Ray Bowen developed composite materials. Dr. F.R. Faunce and Dr. D.R. Myers in 1976 tried acrylic veneers luted on etched enamel surfaces. In 1983, Dr. Harold Horn etched custom porcelain veneers luted to etched enamel surfaces.²

With the introduction of composite resin, etching, and bonding techniques, minor defects can be treated conservatively. While composite veneers have improved since their introduction, they still have a few drawbacks, such as wear, marginal and incisal edge fractures, and discoloration. As a result, composites may require more frequent replacement than is necessary with porcelain veneers.

Porcelain veneers are more stable and have better esthetics. If a porcelain veneer is bonded with a correct adhesive technique and optimal oral hygiene care is maintained, studies have shown that the long-term survival rate of veneers is very high.³

Types of Veneers

Veneers can be placed directly or indirectly. Composites are used for directly placed veneers, and a variety of materials can be used for indirectly placed veneers. These include:

1. Conventional powder-slurry ceramic (feldspathic porcelain). This type of porcelain is layered on the refractory die by the lab technician.
2. Heat-pressed ceramic. These products are melted at high temperatures and pressed into a mold created using the lost-wax technique (e.g., IPS Empress 1 and 2, OPC).
3. Machineable (CAD/CAM) ceramics (e.g., CEREC, E4D).

Indications for Veneer Placement

Veneers can be used for functional and cosmetic correction of the following conditions:

1. Stained or darkened teeth
2. Hypocalcification
3. Multiple diastemas

4. Peg laterals
5. Chipped teeth
6. Lingual positioned teeth
7. Malposed teeth not requiring orthodontics

Contraindications for veneer placement include:

1. Insufficient tooth substrate (enamel for bonding)
2. Labial version
3. Excessive interdental spacing
4. Poor oral hygiene or caries
5. Parafunctional habits (clenching, bruxism)
6. Moderate to severe malposition or crowding

Philosophy of Esthetic Dentistry

Recolor: The first option is tooth whitening.

Reposition: The second option is orthodontic repositioning.

Recontour: The third option is to recontour teeth and equilibrate.

Restore: Once the above options have been explored, the last option is to restore the teeth with veneers or crowns.

Advantages of veneers include:

- Minimal tooth preparation required
- Porcelain veneers are stronger and more durable than composite veneers
- Alternative to full coverage restoration in case of incisal fractures or tooth discoloration
- Color stability

Disadvantages of veneers include:

- Potential for over-contouring
- Requires laboratory procedures
- Porcelain enamel margins may be thin and difficult to finish
- Brittle margins
- Pitting by acidulated fluoride treatment
- Cannot be repaired easily
- Can sometimes be difficult to temporize
- Color cannot be altered substantially after placement
- Placement is difficult and time-consuming

Treatment Plan Phase

It is important to confirm the following before starting the preparation:

1. Check for contraindications
2. Mount study casts
3. Check posterior occlusion (anterior teeth do not function alone)



Figure 1.



Figure 2. Tooth #7 (top) and tooth #10 (bottom) were treatment planned for Empress Veneers. The teeth were whitened before veneer preparation.

4. Confirm that there is no protrusive or lateral interference
5. Check centric anterior lingual contacts
6. Consider three key elements of esthetics: contour, position and color

When restoring anterior teeth with porcelain veneers, you must be aware of incisal edge position, lingual contour, labial contour and inclination.

Clinical Procedure - Visit 1

1. Impression for study models/bite registration record
2. Radiographs/photographs
3. Check contraindications
4. Shade selection

Clinical Procedure - Visit 2

1. Confirm Shade Selection

2. Preparation

In the early days of veneers, either a no-preparation or minimal tooth preparation, not extending into the dentin, was suggested.^{2,4,5} This is once again gaining popularity with certain companies. Dentists routinely remove at least 0.5 mm-0.8 mm

of enamel. Removal of some enamel aids in achieving better bond strength,^{6,7} but care must be taken not to remove more than 0.5 mm-0.8 mm, especially in the proximal and cervical areas. Even though dentin adhesives have improved dramatically, porcelain bonding to enamel is better than porcelain bonding to dentin.⁸

Depth Guide Cuts – Prior to preparation always examine study models in order to avoid over-reducing areas of the tooth that may be rotated or lingually inclined. Hence, the use of a reduction guide is recommended. A diamond depth cut bur can be used to scribe horizontal depth cut grooves on the labial surface of any anterior tooth. Extend these grooves from mesial to distal, taking care not to damage the adjacent teeth that are not being prepared. It may be necessary to angle the bur in relation to the contour of the labial surface to achieve the appropriate depth for these guide cuts. The finish line of the preparation could end gingivally or supragingivally, approximately 0.5 mm incisal to cemento-enamel junction (CEJ). Do not place your gingival depth cut so as to cut into the CEJ area.

Labial Reduction – Using a tapered diamond, reduce the remaining labial tooth structure between the depth cuts. Simultaneously create a chamfer ending 0.5 mm incisal to the CEJ. This reduction should also extend interproximally. Opening the interproximal contact with the adjacent tooth is often preferable to better approximate the veneer and have a clear finish line in the master impression. In cases with mobile teeth and those having recently having completed orthodontics it may be advisable to not pass through the contact areas to prevent tooth movement during temporization.

Types of Veneer Preparation

A. Incisal Chamfer Preparation (Interlock prep)

The incisal edge is not reduced in length. This type of preparation is often used on cuspids and is done in order to preserve the natural guiding palatal surface of the tooth, which is important functionally. Add an additional space for the incisal



Figure 3. Tooth #6 – Incisal Chamfer Preparation (Interlock Prep)
Tooth #7 – Incisal Butt-joint Preparation
Tooth #8 – Incisal Lingual Wrap Preparation
Tooth #9 – Depth Cut

porcelain by creating a chamfer along the facial incisal margin using the tip of a tapered diamond (Figure 3).

B. Incisal Butt-Joint Preparation Prepare 0.5 mm depth cut grooves in the incisal edge. Using the tapered diamond removes the remaining incisal tooth structure. Then round the facial incisal line angle leaving a butt-joint margin along the lingual incisal edge. The incisal reduction should be 0.5 mm-1.0 mm. This type of preparation is done in order to increase the length of the tooth. The length can be increased from 0.5 to 2 mm only.

C. Incisal Lingual Wrap Preparation Prepare 0.5 mm depth cuts in the incisal surface of tooth. Reduce the incisal surface in a manner similar to incisal butt-joint preparation. Reduce the mesial incisal and the distal incisal corners an additional 0.5 mm. Then using a diamond bur, extend the incisal chamfer to the palatal surface. This palatal chamfer should be a straight line mesial to distal. All incisal edges should be rounded. The lingual chamfer line on the wraparound preparation should be above or under the centric lingual contacts to avoid occlusal contact on the interface between porcelain and tooth structure. Contact should be either all on porcelain or on tooth structure. The incisal wrap prep is a popular option for several reasons. It can be used in most patients, easily fabricated by the technician and easily handled by the dentist due to positive seating on delivery (Figure 4).

D. The path of insertion for veneers is in the labial or incisal-labial direction. All undercuts and unsupported enamel in relation to this



Figure 4. Tooth #7 Incisal Lingual Wrap Preparation

path must be removed. A silicone reduction guide is used in order to check the amount of reduction required. The reduction guide is designed to evaluate the amount of reduction at the incisal, middle third and cervical third of the tooth. Use of a reduction guide is particularly important when teeth are misaligned (Figures 5 & 6).

3. Check Contraindications

Final Impression

- Strip contact area using a finishing strip prior to impression to improve visualization for lab technician.
- Place a # 0 cord to reveal the margin, which is left in place while taking the impression.
- Either polyether or polyvinyl siloxane impression materials can be used according to manufacturer's instruction.

Laboratory Instructions

- A detailed prescription is written to the laboratory technicians. The prescription should include:
- Teeth number, required shade, stump shade.
- The type of ceramic required to make the veneers.
- If any changes in anatomy are required for the final result, e.g., increasing length.
- Make a note of any requests made by the patient.

Temporization

- A pre-impression is usually taken prior to temporization and is used as a template for the provisional restorations.
- During the period a patient is in provisional veneers there is a likelihood of postoperative sensitivity. Therefore application of a desensitizer, such as GLUMA,



Figure 5.



Figure 6.

is recommended before the fabrication of the provisionals in order to reduce the sensitivity.

- Different techniques are used to fabricate provisional veneers. We recommend using a silicone putty impression material shell in order to fabricate temps, since it reproduces the wax up or study models very accurately.
- A bis-acrylic temporary material with the required shade is used. The provisional is not removed but is rather "locked in" as a result of shrinkage. The provisionals are then finished and polished in place. Evaluation of tooth reduction is confirmed by examining the provisionals for thin areas. Although it is unlikely to occur while using the reduction guide, it is sometimes necessary to re-prep under-reduced areas. If this does occur, then you must reimpression and retemporize the prepared teeth.
- When fabricating a provisional for a peg lateral or any single tooth veneer, a free-hand composite veneer can also be used.
- To maintain good periodontal health, the patient is told to irrigate the marginal area with a chlorhexidine rinse using an endodontic irrigating syringe.

Clinical Procedure - Visit 3

Veneer Cementation

1. Try-In/Shade Selection

- Remove provisionals
- Use flour of pumice to clean all prepared tooth surfaces and wash thoroughly being careful to not induce gingival bleeding.
- Isolate and dry the teeth.
- Moisten the veneers with water and place them carefully on the prepared teeth to check fit and shade.
- Try-in paste can be used behind facings to check shades.
- If color adjustment is needed, select appropriate shade of try-in paste, apply to veneer, seat, and examine for color and fit.
- Clean the veneers by rinsing with water.
- You should verify with your laboratory technician but the veneers generally come already etched with hydrofluoric acid. Therefore a 30-second application of 37% phosphoric acid is used only for cleaning, not for etching.
- Rinse with water and dry.

2. Cementation

- Apply silane to the etched porcelain surface for 60 seconds and air-dry. This step should be repeated twice to optimize bonding.
- Pumice and wash the tooth preparation dry and isolate the teeth.
- When cementing multiple veneers, you must always start closest to the midline and work distally.
- Veneers are luted two at a time starting with the central incisors and continuing distally.
- Isolate the preparation interproximally with thin Mylar strips or Tefalon tape.
- Etch the preparation in the usual manner indicated by the manufacturer of the bonding agent being used and dry the area.
- Apply enamel/dentin-bonding system according to the manufacturer's instructions. Sixth or 7th generations (self etching) bonding agents are not recommended for veneers only prepared into enamel. Light cure the tooth (adhesive) prior to seating the veneer.
- Apply unfilled resin, after primer if indicated, to the tooth surface and inside of the laminate veneer. Do not cure this layer at this time.

- Apply composite-resin luting cement to the veneer and gently place the veneer onto the tooth in an inciso-gingival direction. Remove excess material gently with a resin-coated brush. Make sure that cement is visible at all the margins to avoid any voids.
- Hold the veneer and check the gingival margin for proper seating. Then, for each of the four regions (gingival, mesial, lingual-incisal and distal) remove any additional excess. Light-cure the gingival margins first for 10 seconds, mesial, incisal and distal. After curing these four areas, cure for 60 seconds through the facial surface. Light-cure each area and margin of the veneer for 30 seconds (longer for thicker, more opaque veneers or darker shades). (Check manufacturers' recommendations for curing time.) (Figures 7, 8 and 9)



Figure 7. Post-veneer cementation



Figure 8. Tooth #7 Post-veneer cementation



Figure 9. Tooth #10 Post-veneer cementation

3. **Finishing**

- Remove gross excess using sharp hand instruments — CL carver or perio scaler. (# 12 scalpel blade)
- Using fine and extra fine diamond finishing burs, remove excess resin gingivally and inciso-lingually.
- Finish the proximals using fine strips.
- Proceed to the next placement.
- Use porcelain polishing paste to regain a smooth porcelain surface whenever necessary.
- Check occlusion in all excursions and adjust as needed.

4. **Night Guard**

- It is recommended post cementation to provide the patient with a soft or a soft and

hard (dual) night guard. This is done to protect the veneers.

Conclusion

With the advent of newer conservative treatments such as vital tooth bleaching and retainer system orthodontics, the indication for veneers maybe reduced. Porcelain veneers are still being routinely used as a way to make esthetic changes for teeth that are discolored, worn, chipped, malformed or misaligned. With the advent of newer porcelains and better bonding agents, porcelain veneers are considered to be strong and have great esthetics as well as a good long-term prognosis.

Course Test Preview

To receive Continuing Education credit for this course, you must complete the online test. Please go to: www.dentalcare.com/en-us/professional-education/ce-courses/ce333/test

- 1. Which of the following is not an indication?**
 - a. Multiple diastemas
 - b. Insufficient tooth substructure
 - c. Malposed teeth not requiring orthodontic treatment
 - d. Peg lateral
- 2. Porcelain veneers may require more frequent replacement than is necessary with composites.**
 - a. True
 - b. False
- 3. Which of the following is not an advantage of veneers?**
 - a. Minimal tooth preparation
 - b. More durable than composites
 - c. Easily repaired
 - d. Improved esthetics
- 4. A patient with Bruxism is good indication for veneers?**
 - a. True
 - b. False
- 5. Veneers are used for functional and cosmetic correction of which of the following conditions?**
 - a. Hypocalcification
 - b. Multiple diastemas
 - c. Both of the above.
 - d. Neither of the above.
- 6. Color of veneers can be altered substantially after placement.**
 - a. True
 - b. False
- 7. Do not place gingival cuts so as to cut into cemento enamel junction area.**
 - a. True
 - b. False
- 8. To achieve interproximal reduction, contacts should be broken in order to prevent teeth movement during temporization.**
 - a. True
 - b. False
- 9. Which of the following is not one of the recommended of veneer preparation design?**
 - a. Incisal Chamfer Preparation (Interlock)
 - b. Incisal Butt-Joint Preparation
 - c. Window Preparation
 - d. Incisal Lingual Wrap Preparation

- 10. When cementing multiple veneers, you must always start closest to the midline and work distally.**
a. True
b. False
- 11. Use of reduction guide is not critical to the success of a veneer.**
a. True
b. False
- 12. Which of the following is critical when using silane in practice?**
a. Must be in a brown bottle.
b. Should be light activated.
c. Must have an expiration date.
d. None of the above.
- 13. It is recommended to light cure the bonding agent on the tooth before cementing the veneer.**
a. True
b. False
- 14. While doing an incisal lingual wrap, preparation lingual contact should not be on _____.**
a. porcelain
b. interface between porcelain and tooth structure
c. tooth structure
d. None of the above.
- 15. Night guards are always recommended after cementation veneers.**
a. True
b. False

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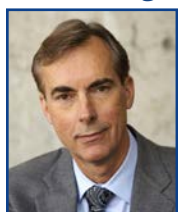


Dr. Anderson is a Research Instructor in the Department of Prosthodontics and Operative Dentistry at Tufts University School of Dental Medicine with a focus on clinical materials research. During his graduate work he developed a digital system that quantitatively analyzes small increments of color change. This process in the past ten years has been used in clinical research around the world. He has presented and authored abstracts and articles in the area of color science and materials in dentistry.

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