A Prepless Composite Bonding Case

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Educational objectives:

Upon completion of this course, participants should be able to achieve the following:

- Understand the benefits of a trial smile.
- Appreciate the conservative approach of bonding.
- Conceptualize the entire sequence of an anterior bonding case.
- Be motivated to add composite bonding into their repertoire of dental procedures.
- Pursue hands-on bonding courses.

Composite is an invaluable material for modern dentists when executing many dental procedures, such as mock ups and temporization; however the most crucial use is in conservative direct veneer cases that require little or no preparation of the natural dentition, which is especially important when treating the young patient. This case study involves the aesthetic and functional transformation of a 22-year-old patient, Lauren. Her chief concern was the appearance of her smile, along with the priority of conservative dentistry, specifically no removal of her natural tooth structure.

continued on page 64

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continued from page 62

Fig. 1: 16 digital pre-op images taken for all new patients and viewed on chairside monitor for co-discovery.

Fig. 2: View reveals reverse smile, lack of central dominance, and anterior cant (which is longer on right side).

Fig. 3: Full face before and after trial smile presented to patient on chairside monitor as opposed to a hand mirror.

Fig. 5: The mounted trial smile model is situated in the right working position as it crosses over.

Interview and Co-discovery

Lauren's first visit began with an interview, which was an opportunity to hear her dental story, along with her concerns and desires. Her chief concern was the shade and shape of #7, which was a peg lateral that had been previously bonded, and had since stained and discolored. She also mentioned that she had an implant in the #10 position because that tooth was congenitally missing. The implant had been placed after orthodontic treatment several years before.

After the interview, 16 digital pre-op images were taken[1] and downloaded onto the chairside monitor for co-discovery of her existing aesthetic and dental health conditions (Figure 1). While the images were being downloaded, Lauren's functional occlusion was analyzed. Her anterior guidance was predominantly group function on both sides, involving all of the posterior teeth on both the working and balancing sides, due to the short anterior teeth.

The full face frontal view reveals aesthetic issues that can readily be seen by others. The profile views display facial support or lack of it by analyzing the relationship of the nose, upper lip, lower lip, and chin, which was ideal in Lauren's case. However, from a frontal view, she displayed a reverse smile with an excess amount of negative space (Figure 2). Other aesthetic issues seen on the frontal and lateral 1:2 smile views included: lack of central dominance due to short, narrow centrals, anterior cant (longer on the right than the left side anteriorly), and excess gingival display above tooth #7.

Trial Smile Experience

Upon discussion of functional and aesthetic problems observed, Lauren was asked if she would like to visualize her smile with the enhancements required to improve both the function and aesthetic issues that we had discussed. With her affirmative request, the trial smile was executed, which consisted of a composite mock up with post-op photos for observation on the chairside monitor (Figure 3). The chairside monitor allows patients to see their smile enhancement in context to their whole face, as opposed to a hand mirror which reveals only teeth[2]. After viewing her full face before and trial smile photos, she asked to see only the laterals mocked up. Therefore, a second series of photos was presented (Figure 4). Impressions of the trial smile, upper natural teeth, and lower teeth were then taken, along with a facebow, and centric relation bite records. We then scheduled a consultation appointment to discuss the options with Lauren's parents.

Fig. 4: The before smile *The trial smile with 2 teeth* *The trial smile with 6 teeth*

Consultation

The second appointment was a follow up consultation with Lauren and both of her parents. The mounted models were used to explain occlusal problems, mainly lack of anterior guidance on the anterior teeth. The mounted models were

utilized to demonstrate improved guidance with the trial smile model, which was cross mounted with the models of the existing upper and lower (Figure 5). Also, digital images were viewed on the monitor of before and trial smile after. Lauren made the decision to proceed with treatment for bonding only the lateral incisors. However, the next week after treatment of the laterals, Lauren's father called and asked if we could discuss the more comprehensive treatment again. Consequently, a second consultation was scheduled for Lauren and her father. We again discussed the functional improvements as well as the aesthetic enhancements that would be achieved by bonding six teeth as opposed to two. Lauren decided, with her father's encouragement, to have the more comprehensive plan. He proceeded to explain that Lauren's mother had been concerned that the bonded teeth could appear artificial, which had made Lauren cautious previously.

Fig. 6: The trial smile matrix helps the clinician view the desired incisal edge position before bonding.

Fig. 7: Pre-treatment analysis with flat plane shows that tooth #8 is approximately the correct length with the occlusal plane.

The Pretreatment Analysis

The first step is to visualize the existing teeth in comparison to the trial smile, which can be accomplished by using a putty matrix made from the trial smile model (Figure 6). The mesial incisal edge of tooth #8 fits into the matrix the most intimately, indicating that very little composite will be added in that area. The matrix helps the clinician visualize the incisal edge position that was worked out in the patient's mouth during the trial smile. Another helpful pretreatment analysis is comparing existing lengths with a flat plane (Figure 7), which shows that tooth #8 is approximately the correct length with the occlusal plane. Therefore length will be added to tooth #s 6, 7, 9, 10, and 11.

Next, the Venus Diamond shade guide is used to determine which shades will blend with the existing dentition, before the teeth are desiccated by treatment procedures. The BL (bleached light) blends nicely with Lauren's natural teeth, and the CO (clear opalescence) matches the bluish tone of her incisal translucency (Figure 8). In addition, the OB (opacious bleach) shade will be used to mask the existing incisal edge as more length is added.

Fig. 8: The Venus Diamond shade guide is made with the actual composite. BL (bleach light) blends with Lauren's natural teeth and CO (clear opalescence) matches the bluish tone of her incisal translucency.

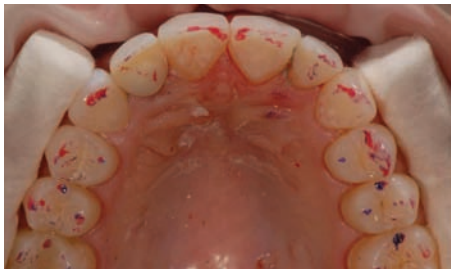

Fig. 9: Progress photo of equilibration and anterior guidance that was pre-planned on an articulator.

The mounted study models also help to determine the necessary added length needed to create adequate anterior guidance and crossover function[3]. In addition there will be some equilibration and reshaping of the posterior teeth in order to create a smooth guidance with no interferences (Figure 9). Composite will also be added to the incisal edge of tooth #22 to augment the guidance (Figure 10).

Fig. 10: Composite was added to tooth #22 on the models and in Lauren's mouth to augment the guidance.

The Bonding Procedure

For this case, no preparations were required, as demonstrated during the trial smile; therefore the teeth to be bonded were slightly roughened with a sandpaper disc. The bonding process began with tooth #9, etching a full 60 seconds for enamel[4], followed by a thorough rinse and dry, then a thin layer of unfilled resin. The opacious bleach shade was placed on the incisal edge to prevent an unnatural line of translucency. Next, bleach light was placed over the entire facial surface. Then the incisal edge was cut back (Figure 11), and clear opacious was added over another thin layer of unfilled resin (Figure 12). The tooth was then con-

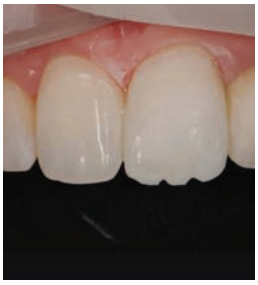

Fig. 11: Very conservative incisal cutback in order to preserve natural enamel.

Fig. 12: Venus Diamond CO (clear opalescence) was added over a thin layer of unfilled resin after cutback.

continued on page 66

continued from page 65

Fig. 13: The cuspids were bonded on the mesial lingual/facial surface to improve function.

Figs. 14 & 15: Throughout the bonding process the incisal view is critically important in assisting the clinician in creating symmetry and balance of the facial surfaces and the embrasures.

Left Fig. 16: Use a fine diamond strip to smooth interproximal in an "S" pattern to prevent obliteration of the contact.
Right Fig. 17: Use a Boley gauge to measure height and width of centrals.

Fig. 18: Studio afters are used for patient appreciation, marketing, and display on Web site.

toured with a finishing burr and discs. Before moving on to tooth #8, the interproximal surfaces of #9 were polished with a fine disk to prevent adhesion to the proximal teeth. Clear matrices were also used to prevent adhesion to adjacent teeth throughout the process.

Since the laterals had been bonded several weeks previously to harmonize with the smaller centrals, it was necessary to add more composite in order to create harmonious proportions for the longer, larger teeth. Before adding to the laterals, they were roughened then etched to clean the surface, silane was applied, dried, followed by unfilled resin, then composite was layered onto the surface. Also, the porcelain crown over the implant in the #10 position was cut back due to the excessive opacity. The porcelain was etched with porcelain etch, then silanated, dried, then coated with unfilled resin before the composite was applied.

The cuspids were bonded on the mesial lingual/facial surface in order to improve the function (Figure 13). The facial surfaces of the cuspids were slightly enameloplastied to create more harmonious buccal corridors, and to enhance the golden proportions of the anterior teeth.

Technique Tips

Throughout the bonding process, the incisal view is important in assisting the clinician with creating symmetry and balance (Figures 14 and 15). Using a clinical mirror, visualize the incisal third, the middle third and the gingival third as three separate planes. Also, analyze the embrasures for symmetry, especially the central embrasure. The mesial line angles of the two centrals should be mirror images. Note the facial anatomy of the centrals; again check for symmetry and balance.

The "mylar pull" is a technique taught by Dr. Corky Willhite[5], that creates a smooth and curved surface on the entire interproximal surface, from the facial line angle to the lingual line angle and from the gingival to the incisal aspect of the line angle. Once the line angles are established, place a clear matrix, then add composite on the facial aspect, sculpt it as desired, then pull the matrix lingually and apically. This action pulls the composite through the interproximal, which fills in voids and makes the interproximal surface smoother and more cleanable, preventing staining and plaque entrapment. Another one of Corky's helpful tips about creating smooth interproximals is to use a fine diamond strip in an "S" pattern to prevent obliteration of the contact (Figure 16).

Use a Boley gauge to measure both height and width of the bonded teeth, especially the centrals as your case proceeds (Figure 17). The centrals are normally 1/16 the height and 1/16 the width of the face. The average ratio is 8.5mm wide and 11mm long. Also, the ratio of the width of the lateral to the central is approximately 1:1.6, however for males it might be 1:<1.6. These measurements are guidelines as opposed to rules.

Digital photography is an invaluable tool from the very beginning until the final step of a bonding case. As mentioned previously in this article, digital images are an excellent communication tool during the initial co-discovery and the trial smile. Then, digital photos were utilized three or four times throughout the bonding procedure to analyze the midline, central dominance, axial inclinations, etc. Upon completion, the final finish and polish were also scrutinized via digital photography. Finally, when the case was complete, studio afters were used for patient appreciation, marketing, and display on the Web site[6] (Figure 18).

Become an avid student of dental anatomy and smile design. Each bonded tooth is a sculpture which should mimic nature, therefore the dental anatomy or shading should appear life-like and natural[7]. For example, the incisal embrasures should increase in size incrementally as they progress distally. Also, the central incisors should be dominant in both height and width, and very slightly the brightest teeth. To create symmetry and finesse line angles, use the side of a pencil lead to define the existing line angles (Figure 19). In addition the smile design should enhance the facial appearance by following smile design principles such as the incisal edges following the lower lip, the gingival line following the upper lip, no midline cant, etc (Figure 20).

Fig. 19: Use side of a pencil lead to define and then finesse line angles.

Tissue management is critical to the long-term success of bonding cases (Figure 21). Cleanability and smoothness of all bonded surfaces can be accomplished using the "matrix pull" and polishing strips interproximally. The margins should be placed at tissue level and conform to the tooth structure with proper emergence profiles. The Sulca brush is pointed and stiff, which enables it to clean the gingival and interproximal surfaces superiorly. All bonding patients are advised to use it daily, along with floss or soft picks.

Conclusion

There are many patients that are concerned about preparation of the natural dentition, especially younger patients. In order to confidently inform the patient that their case can be preformed without preparing the natural teeth, the trial smile is an important indicator. In addition, the trial smile matrix takes the guess work out of the case during the bonding appointment. In Lauren's case, the trial smile photos were the resource that stimulated her father to encourage her to choose the more comprehensive plan, which was not only more aesthetic, but also had better function. The trial smile experience, coupled with the digital images, played a crucial role in the communication between the patient, her parents and the clinician.

Preplanning the occlusion and anterior guidance on an articulator, and designing the smile in the mouth combines the best of both worlds; the aesthetically driven aspects are visualized more ideally in the mouth and the functionally driven issues are more visible on the articulator. Bonding materials continue to improve as each new generation of formulas are manufactured and the techniques available continue to improve with new technology such as digital photography. With careful attention to function, aesthetics, and technique, anterior bonding cases can restore and enhance the smile and dentition comprehensively and conservatively. ■

Fig. 20: After shows more harmonious incisal edges, central dominance, proportional height to width ratios, blending of shades, and more attractive incisal embrasures.

Fig. 21: Cleanability and smoothness of all bonded surfaces and good oral hygiene will insure long-term tissue health.

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Author's Bio

Dr. Hollar maintains a private practice in Arlington, Texas, where she limits her practice to reconstructive and aesthetic dentistry. She is accredited by the American Academy of Cosmetic Dentistry and is a Pankey Scholar. She serves as visiting faculty with the L. D. Pankey Instititute and The Spear Institite. She is an examiner with the American Academy of Cosmetic Dentistry, a board member of the ABCD.

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continued on page 68

continued from page 67

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1. The main purpose of a trial smile is to
   a. inspire the patient
   b. initiate the esthetically driven treatment plan
   c. determine the contours before preparing the case (or not)
   d. all of the above

2. Pre-op images are taken and displayed on a chairside monitor to
   a. co-discover problems and possible solutions
   b. document the case
   c. reference during treatment planning
   d. all of the above

3. Before initiating the bonding procedure, a matrix of the trial smile model is useful to
   a. determine the incisal edge position
   b. decide which shade of composite to use
   c. prevent adhesion of adjacent teeth
   d. all of the above

4. Unprepared enamel should be etched for
   a. 15 seconds
   b. 45 seconds
   c. 60 seconds
   d. two minutes

5. The speaker uses clear matrices to
   a. prevent adhesion of adjacent teeth
   b. 'pull through' the final interproximal contact
   c. both a and b
   d. none of the above

6. Adding length to the incisal edge requires an opaque composite to
   a. create a halo on the incisal edge
   b. prevent a line of translucency
   c. cut back areas that replicate developmental lobes
   d. both b and c

7. After the incisal cut back, the clinician should add
   a. an incisal composite shade to create areas of translucency
   b. a dentin shade to block out the lobes
   c. extra chroma to age the teeth
   d. none of the above

8. The incisal embrasures should be
   a. smaller as they move distally
   b. incrementally larger as they move distally
   c. all be equal in size
   d. perfect triangles

9. The central incisors should be
   a. the same shade as the laterals and cuspids
   b. slightly brighter than the other teeth
   c. dominant
   d. both b and c

10. Post operative photos are useful for
    a. display of cases on websites
    b. marketing
    c. patient appreciation
    d. all of the above

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