Buyers' Guide to Posts Page 120 • Computers Page 112 • Buyers' Guide to Pins Page 125

DENTISTRY TODAY

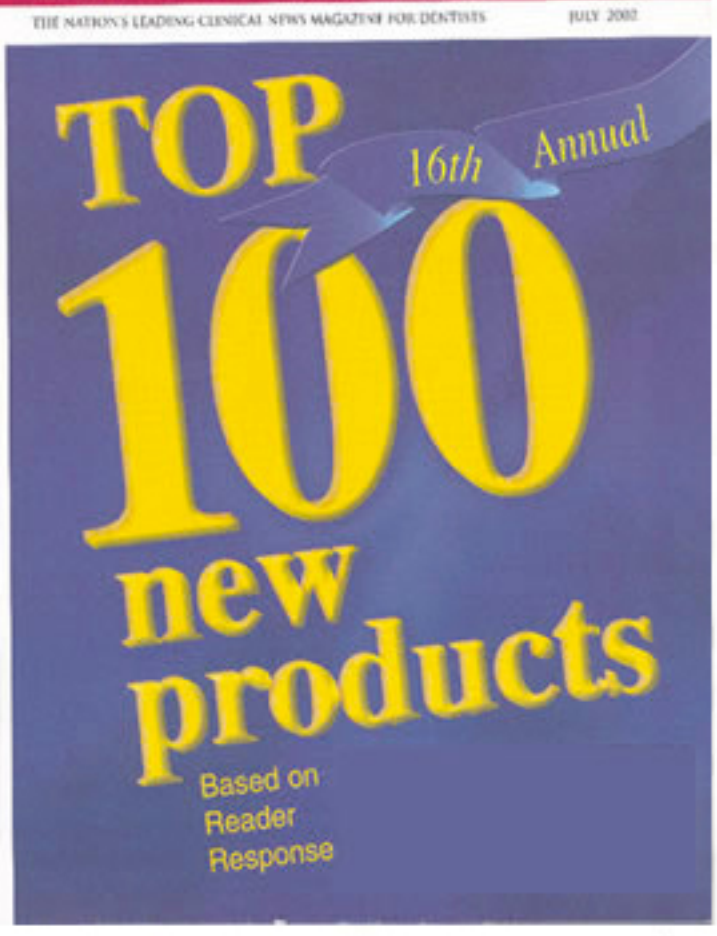
Circulation 150,000

VOLUME 21 NO. 7 THE NATION'S LEADING CLINICAL NEWS MAGAZINE FOR DENTISTS JULY 2002

Jerome F. Rasmussen, DDS, MHA
Prosthetic Joint Guidelines

Lorie Berland, DDS
Aesthetic Solutions

Bruce A. Stephenson, DDS, MAGD
Paperless Dentistry



A Missing Front Tooth

By Lorie Berland, DDS

Today's standards for natural-looking anterior dental prostheses that are stable and aesthetic are high. Modern dentistry demands mastery of the best techniques, equipment, and materials to recreate nature with durable restorations. Replacing a maxillary anterior tooth poses a challenge for even the most adept cosmetic dentist. In this critical smile zone, you must restore both aesthetics and function to a high degree, while working around limitations such as preservation of tooth structure, the periodontal attachment, and exact color match including shade, hue, chroma, and value.[1]

There are a variety of restorative options from which to choose, including removable options, different types of fixed bridges, and implants. Whatever the choice, a high degree of skill and knowledge of techniques and materials must be employed to ensure a successful outcome with a good prognosis, because this area is highly visible and under careful scrutiny with every smile.[2]

Replacing a maxillary anterior tooth poses a challenge for even the most adept cosmetic dentist.

This task presents even more of a challenge for a younger patient needing a fixed tooth replacement. I have seen many such cases, including a 12-year-old girl who was congenitally missing tooth No. 7 (Figure 1). This patient was too young to consider an implant. She had just completed orthodontic treatment. She and her parents were concerned about traumatizing the adjacent virgin teeth in preparation for a traditional three-unit bridge. The large pulp horns associated with young teeth are a major concern when planning preparation design. To ensure that such a young patient shows no signs of wearing a prosthesis, the best fit, restorative materials must be used to create the most natural gentle with minimal visibility of any retainers. Even with these limitations, the aesthetics, function, and retention must be optimal. For this patient, my choice of treatment was the porcelain-bonded fixed bridge with resistor wings.[3]

Figure 1. Patient congenitally missing tooth No. 7.

Figure 2. Shade-eye NCC chromometer.

Figure 3. Photographs of shade shade tabs placed in Vita shade tab holder and for accurate color reproduction.

Figure 4. Vita Contemporary Cutting Kit.

Figure 5. Mandibular cast for indirect preparation.

Figure 6. Diamond chamfer preparation.

Figure 7. Final diamond chamfer preparation.

Figure 8. Conservative preparations for bridge with resistor wings.

Figure 9. Vitalux Electric Dental Unit.

Figure 10. Retained teeth, 10 and 11, and tissue in place, ready for bridge.

Figure 11. Shade tab, Vita Classical, placed on prepared teeth for shade selection.

Figure 12. Lingual view of the preparations, showing the pontic area.

Figure 13. Final shade selection, shade tab placed in the pontic area.

Figure 14. Shade tabs placed in the pontic area for shade selection.

Figure 15. Final shade selection, shade tab placed in the pontic area.

Figure 16. Final shade selection, shade tab placed in the pontic area.

Figure 17. Shade tab placed in the pontic area for shading of bridge.

Figure 18. Shade tab placed in the pontic area for shading of bridge.

Figure 19. Final photograph.

I have seen this type of bonded bridge in at least 20 cases over the past 10 years, and all of them are still in place and functioning well.

The porcelain-bonded fixed bridge is ideal in a case such as this, which involves replacing only one tooth, with no shift to the adjacent teeth, and with optimal abutment teeth with proper height and vertical location. The retainers for such a bridge require a much more conservative preparation design than the traditional PFM bridge, and cases of fractured wings that are visually invisible from the facial view and almost invisible from the palate. The bridge is highly retentive when using the best adhesive resin cement, and its strong connectors between the pontic and the abutments allow some flexure while still resisting cement in the face of stress and fracture forces.[4]

COLOR MATCH AND THE SHADEEYE NCC

In a case that involves replacing a missing front tooth, we face the ultimate dental challenge. Color clarity is obviously an extremely critical factor in aesthetically perfect tooth reproduction.[5] The ShadEye NCC Chromometer (Shade-eye) is designed to identify the exact hue, shade of the tooth being measured for accurate reproduction (Figure 2). Visually shade taking with prescribed shade comparison products are both costly and frustrating, but are routine because of the inherent inconsistency in shade taking, and to minimize the variable influence of surrounding colors and lighting. To minimize matrix, color prompts can vary from individual to individual. Furthermore, communication of the perceived color between the dentist and the lab technician can be difficult. The subtle variables that influence human subjective interpretation of color are greatly reduced with the ShadEye NCC.

The ShadEye NCC is a highly sensitive electronic shade-taking device, and is designed to interact with the operator to identify the most precise, matrix shade possible, and concurrently the information to the laboratory for exact color.

The ShadEye NCC can read even the smallest differences in tooth shade that make shade taking difficult. It engineers this difference in measurement, how to make it clear and easy to understand, and more importantly communicate this information to the lab technician in unambiguous understandable fashion. The ShadEye NCC gives us the exact shade, hue, and value of the tooth to be reproduced, and also gives a "recipe" for color formulation using the Shade Vision Mixe Formula System. This computer-assisted alternative provides a positive communication tool between the dentist and the lab technician, allowing for perfect tooth reproduction.

HOW ABOUT BEIGE?

The universal specialty standard formula for quantifying and expressing color is the L*a*b* color space paradigm. Tooth colors are found in the upper lightness area of the yellow-red zone in the L*a*b* color space. The ShadEye NCC colorimeter expresses tooth shades numerically according to the L*a*b* color measurement space. Being a colorimeter colorimeter, it reads color similar to the human eye, yet performs even better as it gives precise color measurement. When combining the computer-generated recipe derived from the universal L*a*b* measurement with the Shade Vision Mixe Formula System, you are certain the most natural looking, beautiful restoration. Shade's opaque dental materials have excellent masking ability due to the sub-micron particle technology that allows the porcelain to refract light. By utilizing Shade's layer opacity technique with its porcelain, you can create absolutely natural-looking restorations.

STEP BY STEP USE OF THE SHADEEYE NCC

First Observation

Look at the tooth to be measured to observe the color and characteristics that should

CONTINUED on page 102

A Missing Front Tooth
CONTINUED from page 99

be performed as a first observation. Turn the Flash NCC.

Place a clean Contact Tip on the ShadEye NCC, turn the ShadEye NCC and "ON," and allow according to instructions.

Shade Measurement

With the Contact Tip in the proper position, press the measurement switch button. The ShadEye NCC will flash. Wait for the green ready light to illuminate, and repeat. Usually only three flashes are necessary, and the ShadEye NCC LED will display "SUC" and begin printing. Depress the "DISPLAY" button on the handheld unit and the ShadEye NCC will print the "recipe."

Second Observation and Verification

To verify agreement of the shade measurement and a second observation of characteristics of the tooth, select the recommended Vintage Shade tab noted in the printed recipe, place that in the Gump and observe from next to the tooth measured (and the tooth) to be reproduced if different than the measured tooth). Take a digital picture for a more accurate duplication.

Recording and Communication of Shade Information

On the laboratory prescription, note the following information.

(a) The tooth from which the shade measurement was taken.

(b) The location on the tooth where the shade measurement was taken.

(c) Note if the middle third of the tooth is lower in chroma than the serviced shade. If shade is 1, Gum 2.5 is VI shade lower in chroma.

(d) Incisal characteristics and position.

(e) Drawings and/or photos are helpful in communicating existing or desired characteristics.

Along with the Shade shade slip prescription, I like to send a digital photograph of the shade tabs in the Gump placed next to the segregated and prepared tooth, to capture the natural characteristics of the teeth to be duplicated. In this case, the patient's shade slip recorded A3 Gum 3D.[6] The appropriate shade tabs were inserted into the Gump that matched the patient's gingival color and placed next to her adjacent teeth to be color matched. A digital color photograph was taken using a Kodak DC290 mass digital camera, and printed on Kodak paper using the Kodak 1200 medical image printer. This image was forwarded to the laboratory along with the Shade shade slip (Figure 3).

PREPARATION

Next, the adjacent teeth were prepared for retainer wings on the respective mesial and distal surfaces using the Shade Contemporary Cutting Kit (Figure 4). A small round diamond bur (801D-1) was

used to outline the margins of the preparations (Figure 5). Rounded tapered diamonds (806KC-1 coarse and 806M-1 medium) were used to remove any undercuts and create parallel axial walls (Figures 6 and 7). With the least adhesive materials on the market, excellent retention is possible without extensive preparations, and a very conservative design was employed (Figure 8). After the preparations were satisfactory, an impression (3M ESPE polyether impression) was taken using a Premier anterior tray (one Premium polyether in hydrophilic, the teeth were not dismantled, and the set around the preps and in the tray resulted in more better "seating" for improved adaptation to the abutments.[7]

CREATING THE PONTIC SITE

To create the illusion of a natural tooth, every detail must be considered, from the choice of the material and shade for the pontic, to even the soft tissue surrounding the pontic.[8] For the pontic to appear as if it is growing out of the surrounding periodontium, you must carefully plan the way it will fit into the contour of the gum tissue. Because the edentulous space in this case never housed an actual tooth, a dummy pontic was used to create the illusion of a tooth growing out of the gum. This challenge proved simple and fast using the Robert Hyder Dentomaxillofacial unit (Figure 9). This device is currently the standard in maxillofacial surgery, and has been adapted for use in dentistry. There is no bleeding, excessive bleeding or unpleasant odors, and the tissue heals very well. Tissue clearing and shrinkage, as well as fast and painless spread, are reduced. Separate cutting and coagulation control permit precise individual power adjustments at a quarter of the voltage required for monopolar electrosurgery. This case required two different tips, Nos. 2201 and 2202, to create the desired surface and remove tissue tags to have a smooth, aesthetic tissue pontic area (Figures 10 and 11). Gentle Gel (Hydrex), a topical ointment containing the cure and healing of, was applied to the gums to promote healing (Figure 12).

TEMPORIZATION

Temporization for this patient posed a challenge. Even though the patient had lived with this edentulous space up until now, I wanted to give her a temporary restoration that was easy to fabricate but would be durable and aesthetic enough to wear until the seating appointment. In order to fabricate a template, I took an alginate impression and built the missing tooth with composite. From this model, I vacuum formed a clear 0.02-mm splint and verified the fit (Figure 13). After fitting the template with an A-1 resistant bis-acrylic temporary crown and bridge

CONTINUED on page 102

A Missing Front Tooth
CONTINUED from page 101

material (Protemp, 3M ESPE), I seated it on the tooth and let the resin completely set (Figure 14). The excess material was removed and the resin was cleaned, with the pontic remaining in the clear shell. This treatment was easy and comfortable to place, and the patient now had a provisional that both replaced her missing tooth and acted as an orthodontic retainer until her next appointment.

LABORATORY

In the laboratory, this case was a little trickier than usual because I wanted the added strength of an "overcast" metal frame. As you can see in the final results, the lab did an excellent job. The only bits of the aesthetic metal frame inside is a small tip on the distalingual (Figures 15 and 16).[9]

> *This type of restoration has proven retentive, functional, and highly aesthetic.*

CEMENTATION

When the patient returned for her seating appointment, the gingival tissue had healed perfectly, and she was ready for seating of her final restoration (Figure 17). The rubber surrounding the transitional was removed to try on the fixed bonded bridge. After inserting the fit and margins on the master, I seated the bridge intraorally to verify the tension, retention, and aesthetics. The gums had healed nicely. In a case involving a missing anterior tooth, the laboratory assumes a look of tissue on the pontic will create a slight blanching of the tissue when cemented.

Applying slow pressure and lightly air-drying prepared the restoration. The preparations were etched with 37% phosphoric acid, vigorously rinsed, and gently air-dried. Single Bond (3M ESPE) was applied to the teeth in three to four coats, and gently air-dried until the gloss was dry but glassy. The restoration was then seated in place using Rely X Ans Resin Cement (3M ESPE). With applying firm finger pressure, the luting agent was allowed to fully set for 4 minutes, and the excess was removed. The cement was further cured with the Virtuoso Light (Den-Mat). Occlusion was adjusted, interproximal areas were cleaned, and the entire restoration was polished using the Shade Contemporary Polishing Kit (Figure 18), which included six shades of fine and superfine T and F diamonds and six accessible steps and points from pre to champagne.

CONCLUSION

In this case, the fixed bonded bridge with resistor wings provided an aesthetic and durable choice to replace a missing tooth without placing unnecessary trauma on the abutment teeth (Figure 19).[10] In my experience, this type of restoration has proven retentive, functional, and highly aesthetic. New shade-matching and electro-surgery technologies have made the bonded bridge even better.●

Acknowledgment

The author would like to thank Westbrook & Associates for the excellent lab work described in this article.

References

1. Garber D, Salama H. Esthetic considerations in anterior tooth replacement. Pract Periodontics Aesthet Dent. 1996;8:9[illegible].
2. Kaufman E, Coelho D, Colder M. Computer-aided design of anterior maxillary fixed partial dentures. Int J Prosthodont. 1995;8:210[illegible].
3. Magne P, Hodges J, Belser U. Combined resin-bonded and bonded porcelain fixed partial dentures: a 3-year prospective study. Part I. Int J Prosthodont. 1999;12:326[illegible].
4. Zalkind M, Hegde V, Yaman P, Dennison J. Contrast ratio and color of porcelain veneers. Int J Prosthodont. 1998;11:[illegible].
5. Chang Y, Chen J, Chen K, Chen C, Lin C, Lai Y, Lee S. Effect of ceramic core and veneer thickness on the color of IPS Empress 2 ceramic. Int J Prosthodont. 2004;17:[illegible].
6. Schwabacher W. An accurate shade communication system for dental prosthetics. Pract Periodontics Aesthet Dent. 1994;6:[illegible].
7. Felton D, Kanoy B, Bayne S, Wirthman L. Effect of in vitro corrosion on retention of cemented cast crowns. J Prosthet Dent. 1991;65:[illegible].
8. Pontons-Melo J, Furtado de Mendonça M, Furtado de Mendonça A, Calvo-Henriquez C, Vasconcellos A, Nogueira-Filho G. Influence of artificial gingival color on the aesthetic outcome of implant-supported prostheses. J Prosthet Dent. 2014;112:[illegible].
9. Kinsel R, Lundquist D. Porcelain veneers: a review of the literature. J Esthet Dent. 2000;12:[illegible].
10. Rosenstiel S, Land M, Fujimoto J. Contemporary fixed prosthodontics. 3rd ed. St Louis: Mosby; 2001:[illegible].

Dr. Berland has practiced in the Dallas-Fort Worth area since 1982. He is a fellow in aesthetic dentistry, is in his practice emphasizing clinical dentistry, restorative dentistry, and aesthetics. For a resume and information, visit "The Lorie Berland Centers for Cosmetic Dentistry Veneers & Full Mouth Makeovers" or for appointments, visit the website http://www.lorieberland.com. Dr. Berland can be reached at (214) 363-2110.