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Predictable Real World Aesthetics

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Introduction

Single centrals and laterals are generally the most difficult cases and need the most exact communication, an understanding of preparation design, preparation color, contour, texture and an intimate relationship with your porcelain system to achieve satisfactory results. This patient's chief complaint was a broken tooth.

History

- The patient, a 48- year-old female, presented with a pre-existing crown on tooth #7 broken off. The patient mentioned that she would like to achieve harmony with her natural teeth. She felt that her laterals did not match well due to shape, color, incisal effects and surface texture.

Diagnosis and Treatment Plan

After a successful comprehensive clinical examination and diagnosis by the dentist, it was determined that the tooth was non-restorable due to crown and root fracture. Recommended treatment was extraction of

tooth #7, immediate implant placement and all-ceramic crowns over #7 and #10. Due to financial restraints the treatment would consist of one all-ceramic pressable crown for #7 over a zirconia custom milled abutment. The goals would include:

- Natural emergence of crown from tissue
- Create harmony with the natural teeth by improving shape, color, incisal effects and surface texture

A temporary crown was made for the time being, pre-operative photos were taken and the patient was referred to a specialist, Dr. David Sorboro, for extraction of tooth #7 and immediate placement of an implant.

The patient was sent back to Dr. Kurt Thomas for placement of a temporary abutment and new provisional to create an ideal emergence profile of the crown from the tissue (Fig. 1). Once an ideal emergence was created a tray impression post was placed and the final impression was taken (Fig. 2). The case was then sent to the laboratory.

Laboratory Procedure

After receiving the case in the laboratory, the analog was ordered, placed in the impression, soft tissue was

injected and stone models were poured. Once the models set up they were mounted in maximum intercuspation on a Stratos articulator. Next, an ideal functional full contour removable wax-up was done and the model was then duplicated and poured up in die stone. Several matrixes, lingual, facial, incisal and a clear full contour were fabricated to ensure accurate and ideal fabrication of the abutment and at the same time assure adequate space for the porcelain application. A prescription form was filled out dictating the parameters of the custom abutment to be designed. We requested slight blanching following the emergence of the tissue with shoulder preparations and margins to be placed 1.0mm subgingival buccal/ facial, 0.75mm subgingival mesial/distal and 0.5mm subgingival lingual.

The prescription with all of the models for communication was sent to Atlantis for the abutment fabrication. When the abutment was received it was placed on the model and checked with all of the matrixes from the diagnostic wax-up to verify the accuracy and need for further modification (Fig. 3). Next, the zirconia abutment was coated with a wash firing of zirliner

(Ivoclar) and was baked; this will shade the abutment to the appropriate dentine color for the final shade. With the zirliner application the abutment can be etched to simulate a natural tooth ready to receive a bonded all-porcelain crown (Fig. 4).

Two coats of die spacer to leave room for cement were applied on the abutment. The abutment was then lubed and a full contour matrix of the wax-up was injected onto the abutment. After the wax-up was finalized, it was then separated, sprued, and invested according to the manufacturer's instructions.

The patient was seen for a custom shade match. All of the patient's tooth characterization and shades were photographically documented.

Swiss SNF Ingot BO50 (Swiss SNF Metals [Toronto, Ontario, Canada]) was chosen for this case based on the shade of the adjacent teeth. The patient had relatively translucent teeth with an intense amount of characterization. The desire was to select an ingot that would act as a pallet with the correct value so that with just an internal stain application we could mimic the color and internal characteristics of the natural teeth.



Fig. 1: Provisional to create ideal emergence profile



Fig. 2: Ideal emergence

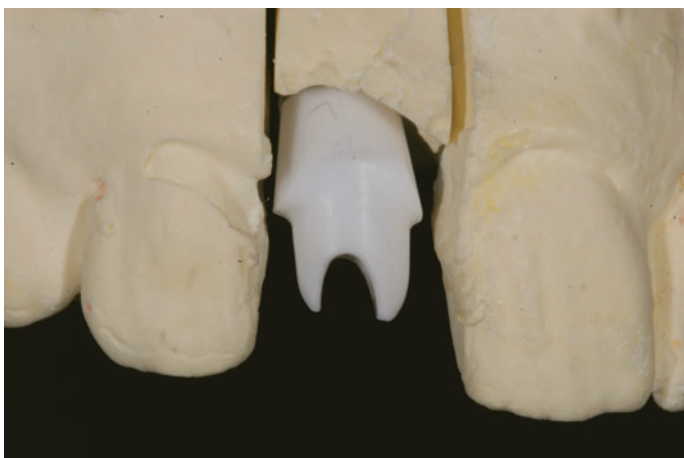


Fig. 3: Zirconia custom abutment prior to modification



: Fig. 4: Custom Zirconia abutment with zirliner application tried in intra-orally

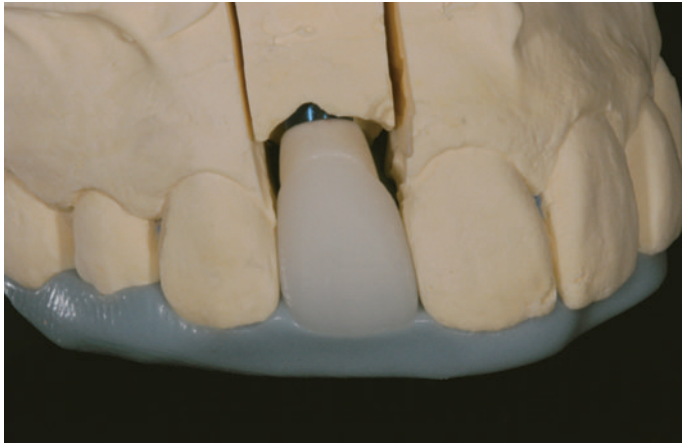


Fig. 5: Pressed crown ready for characterization



Fig. 6: Cut-back crown with internal characterization



Fig. 7: : Application of silver powder to evaluate surface texture



Fig. 8: Restoration after final polishing



Fig. 9: Before full face



Fig. 10: After full face

The restorations were then pressed in the zubliner press furnace, cooled and then devested. They were cut off from the sprues, and fit back to the master die model.

The pressed restorations were then contoured to the final shape. Occlusion was checked and adjusted; contacts and margins were also checked to be intact. An incisal edge matrix was made using Sil-Tech putty, to index the location, shape, and length of the finalized incisal edge (Fig. 5). Using the photos as a guide, it was determined that the entire facial aspect would be cut back all the way to the margin of the crown. No vertical incisal reduction would be done.

The cut-back was designed to mimic the internal mamelon forms while maintaining the palatal aspect of the crown. The matrix served as a guide in achieving accurate reduction.

The cut-back pressed restorations were then sandblasted with glass beads, steam cleaned, and put onto the shaded zirconia abutment. Long lasting glaze liquid was applied onto the entire crown ready to receive the stain characterization. The crown was then placed onto

the shaded zirconia abutment and was to act as the stump shade.

Stain was placed internally to mimic the gingival and body shade along with incisal translucency and internal mamelons. The crown effects were evaluated and then the stain was fired at 725 degrees Celsius.

Once the restoration had cooled, glaze liquid was applied to check the effects and to make any needed enhancements (Fig. 6).

Being satisfied with the color and characterization of the internal stain, a second bake was done at 725 degrees Celsius using clear porcelain to fill in the final contours. As soon as the restoration had cooled, the crown effects, shade, and value were checked. No further enhancement was needed.

When the final contouring was completed, surface morphology and anatomy were added using diamond burs to mimic as closely as possible the surfaces of the adjacent teeth. A thin layer of silver powder was applied over the surface to check how the crown blended with the natural teeth (Fig. 7). Margins were checked and rubber-wheeled



Fig. 11: Before full smile



Fig. 12: After full smile



Fig. 13: Before retracted view



Fig. 14: After retracted view

for accuracy. After checking the restoration on the articulator, and making sure all excursive, protrusive movements and all contacts and contours were satisfactory, the restoration was ready to be glazed. The SNF Glaze Paste was then brushed onto the restorations and baked at 705 degrees Celsius.

The restoration was ready for a final diamond polishing to achieve the appropriate surface gloss (Fig. 8).

After checking all criteria had been accomplished, the restoration was etched, salinated, rinsed, and dried.

Conclusion

A case that seemed very difficult and would take multiple efforts was simplified with a logical, minimal

sequence of steps that created predictability and improved aesthetics (Figs. 9-14).

Acknowledgment

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References

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About the Authors



A graduate of Case Western Reserve University School of Dentistry, **Dr. Kurt Thomas** began private practice in 1984. He continually broadens his skills through advanced training in esthetic and restorative dentistry and provides optimal care and comfort through the latest technology. An active member of the American Dental Association, Ohio Dental Society, and Cleveland Dental Society, Dr. Thomas has served on the Case Western Reserve Alumni Board of Directors and is a Clinical Instructor at Cuyahoga Community College. He is also a Curriculum V graduate of the prestigious Pankey Institute, a renowned facility for experienced dentists who have established, progressive dental practices. Dr. Thomas has selected staff members for their skills and compatible commitment to exceptional patient care.



Arpad Csapo is co-owner of Csapo Dental Arts Laboratory in Fairview Park, Ohio. He is a Sustaining Member of the American Academy of Cosmetic Dentistry. He lectures nationally and internationally on dental ceramic techniques, dentist laboratory communication and has published several articles in international journals. His passion is contagious and he excels in diagnostic waxing, case planning, and design of functional aesthetic restorations with a master touch.