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All Ceramic Implant Abutments for Ideal Esthetics

by Dr. Dean C. Vafiadis

Implementation of implant therapy, as an alternative treatment, has catapulted us into a new realm of tooth replacement and esthetic capabilities. Today, we are not so concerned about failure rates or wondering if osseointegration will occur. Our current dilemma is how are we going to restore these implants as well and as predictable as our veneers and all porcelain crowns? Over the past five years the availability of new ceramic materials has made it possible to create natural, life-like implant-supported restorations.

Can we honestly tell our patients that implant replacement of a missing tooth in the "Esthetic Zone" will be as pleasing to them, and us, as a three unit ceramic or PFM bridge? To avoid the difficulties of implant treatment and endless variables of constructing and "quarterbacking" an anterior implant restoration, the answer for some clinicians is no.

However, studies have shown that the average three-unit bridge over the course of 15 years has a 23% complication rate, while the complication rate of implants over the same period is only 9%. Implant treatment has some powerful advantages over a traditional bridge.

Advantages

Implant rehabilitation conserves natural tooth structure since abutment teeth don't have to be prepared. Saving natural teeth should be our priority. The patient's bony architecture is preserved, since the lost "root" is being replaced. Implants won't become sensitive, won't have recurrent decay and won't become non-vital with all the ensuing problems. Oral hygiene is often easier for the patient with implant-supported crowns than with fixed bridges.

Concerns

Implants in the esthetic zone require attention to detail as well as other sophisticated procedures. Anterior implant esthetics may be very difficult to diagnose, treatment plan and execute - not to mention the laboratory steps, components and provisionals. However, the solution should not be advocating the 3-unit fixed bridge as the "better" option because of expediency. Once the learning curve is overcome, and with the use of ceramic implant abutments, implant therapy in the esthetic zone should be the treatment of choice.

Philosophy

After committing to this concept, you must learn and understand the intricacies of anterior



fig 1- After four months of healing implants #12 and #13 were exposed. This photo is three weeks after stage II surgery.



fig 2- Impression copings in place.

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implant esthetics and charge a premium for your services, including work-up fees, provisionals and custom gold or ceramic abutments. Work with excellent surgeons to accent your treatment plan and help with patient education and sequencing. You will be providing patients with the best dentistry possible and treating them as you would your own family.

Guidelines

What assessment is necessary to determine whether to go the implant or fixed bridge route? Here are some factors to take into consideration. Work within the esthetic and practical parameters of the adjacent natural teeth. Are they vital or non-vital? If they are non-vital, and may ultimately need a post and crown, then maybe the leaning should be towards a bridge. The same might apply if they were very dark or had huge old restorations. But if the adjacent teeth are vital with natural color translucency, then implants would be the preferred treatment.

Bone

Has there been significant vertical or horizontal bone loss? If so, this will mean extra steps for implant therapy, and the patient must be educated to the necessity of hard tissue augmentation. Their condition will fall into these categories. (1) Slight – autogenous graft with Bio-Oss material (2) Moderate – autogenous bone from the chin (3) Severe – ramus or large particle chin graft.

Gingiva

What does the gingival architecture look like? Is the gum line receding or uneven? Are the papillae blunt, knife-edge or normal? For the best esthetic results, there may be a need for soft tissue augmentation. (1) Slight – small releasing incision to alleviate gingival bulking (2) Moderate – Small connective tissue graft (3) Severe – Large connective tissue graft.

Occlusion

Treatment in the esthetic zone will be influenced by the occlusion. Is there a stable posterior vertical dimension supported by the patient's natural teeth or do they have a worn partial denture? What does the patient's anterior guidance scheme look like? If you are leaning towards a bridge over an implant, then many more occlusal adjustments might be necessary. When using ceramic abutments the restorations all must have light contact in centric occlusion and no contacts on excursive movements including protrusive.

Provisional Restoration

The provisional restoration should imitate the final restoration as closely as possible. This permits the patient to have cosmetic input in the early stages of treatment. The temporary restoration will provide for excellent esthetic healing of the gingival tissue and will reveal the need for any gingival enhancement that may be necessary. It will also confirm the occlusal scheme and anterior guidance.

Step by Step

After healing of the implant the prosthetic dilemma begins. (1) Take a fixture level impression, counter and bite registration. (2) Insert the provisional abutment and, with temporary cement, place a highly polished temporary crown. (3) Wait 4 weeks to see tissue response. Usually, the tissue responds by moving slightly apically with minimal recession. At this point the clinician must decide to accept gingival height and start completing restoration, refer the patient back to surgeon for soft tissue graft or adjust the gingival position of adjacent teeth to even the gum line. If augmentation is performed, then a minimum of another 4 weeks of healing is necessary. (4) When the tissue height is acceptable, the final abutment should be chosen. For anterior implants [1st premolars forward] we prefer all-ceramic abutments because of their translucent qualities. Choices include ZiReal Post – composed of Tetragonal Zirconia Polycrystals [3i Implant Innovations, West Palm Beach, FL] or CerAdapt Abutment – composed of densely sintered high-purity aluminum oxide [Nobel Biocare, Loma Linda, CA]. There is also a pre-fabricated Abutment from 3i called Gingihue, which comes as straight or angled. (5) The final ceramic abutment is milled to an ideal preparation by the lab. (6) The ceramic abutment is inserted, torque screwed to 25-30 Ncm and verified with a radiograph. A cotton pellet is placed in the access hole and sealed with strong dual-cure



fig. 3 - A ceramic abutment is chosen for implant # 10 and prefabricated titanium abutments are milled into ideal preparation for #'s 12 & 13. Castings are verified for fit. Preparation of ceramic abutment is fine tuned intra-orally. There is slight bleeding of immature tissue. Provisional is placed back to wait for tissue healing around final prep.



fig. 4 - Tissue healing 3 weeks post-op.

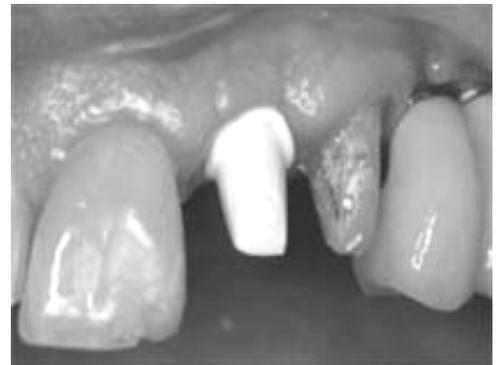


fig. 5 - Posterior crowns are completed to establish good posterior occlusion, and verify guidance with provisionals. There is further healing of tissue at site #10. There is some recession in the posterior, showing that we did not wait long enough for maturation of the tissue. The final impression of implant # 10 and tooth #11 is taken.

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figs. 6, 7 - Insertion of Empress units with resin dual cure cement.



figs. 8, 9 - Tissue 3 weeks post insertion.

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composite [Core Paste – Bisco] (7) An impression is taken of the ceramic abutment, and the ceramic restoration is fabricated on the die model, insuring marginal integrity and precise fit. (8). The prep can be refined if necessary. The ceramic restoration is placed for shade approval and occlusal adjustment. (9) The final ceramic restoration is cemented. This process results in esthetic implant restorations with life-like appearance and undetectable margins and color match.

Advantages of Ceramic Abutments

Ceramic abutments provide better esthetics by transmitting color through the restoration; the blocking out of titanium abutments leads to thick ceramic restorations that cannot mimic natural hues and values. In combination case where veneers and all ceramic crowns are being used the esthetic advantage is seen dramatically. Transillumination and life-like appearance is lost on conventional bridges and PFM crowns.

Using ceramic abutments can mask the gingival margin. The color tones that illuminate from the tissue can transmit light to reflect natural color and esthetic restoration. On many PFM crowns, bridges and even titanium implant abutments there may be recession occurring after several years; this is an unpredictable dilemma that results in “black lines” or exposed metal.

Less plaque accumulation and bacterial colonization has been reported with ceramic abutments due to their highly polished surfaces.

Assuming the implant is placed in the proper position, within 5 degrees of center, the ceramic abutment will allow for ideal preparation design similar to that of an all-ceramic crown. An axial wall of at least 6mm is necessary without compromising strength. The axial inclination plus the occlusal clearance for the restorative ceramic material should be at least 8mm from the head of the implant. A minimum shoulder of 1.5mm is recommended but the author prefers at least 2mm shoulder for better seating capabilities and added strength.

Conventional lab procedures are utilized with ceramic abutments. The initial preparation is performed in the laboratory and fine-tuned intra-orally. Conventional retraction is easier on the ceramic abutment than a natural tooth because of the smooth surface and no bony attachment at the collar. A final impression is taken of the cemented abutment, which allows the technician to work on a die model, as they would any other ceramic crown.

Limitations

All patients that are being considered for ceramic abutments should have good posterior support and an anterior protected occlusion with canine guidance. This will prevent any excursive contacts that may cause fracture of the abutment. In addition no protrusive contacts should be placed onto a restoration with a ceramic abutment. If this cannot be avoided, then careful measurements with special Artus foil (9 micron) paper must be performed to insure stress distribution of the protrusive contact. In the seven years of use of ceramic abutments the author has restored 79 implants with ceramic abutments. Five of the 79 abutments have fractured within a 7-year period. This is a 6% failure rate. Of the 5 fractures that occurred all patients lacked anterior guidance. For the past four years, using good occlusion as part of the patient selection process, there have been no fractures in over 55 ceramic abutments.

Ceramic implant abutments are technique sensitive. Handling of the ceramic abutments has a distinct learning curve. The seating must be checked before a torque of the screw to 30Ncm is applied. A radiographic examination should be taken after seating to insure proper position and the absence of any contact of the ceramic abutment with the bone. Any impingement may cause necrosis of the bone cells.

Case 1

A 68 year-old female presented with infection of her lateral incisor # 10 due to periodontal disease. In addition, teeth #'s 12 and 13 were loose due to trauma from occlusion and periodontal disease. Preserving her teeth was a major concern. Removable partials were not an option for her. Two alternative treatment plans for a fixed restoration were offered.

Option 1: Extract teeth #'s 10, 12 and 13 and place a fixed provisional on teeth # 11 and #14, which were both non-vital for ten years. After healing and periodontal treatment a 5-unit fixed bridge from first molar to canine with a mesial cantilever tooth # 10 would be constructed.

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Extending the bridge to tooth # 9 would sacrifice an additional tooth without a major stress benefit and add an esthetics' problem of matching the other central incisor.

Option 2: Extract teeth #'s 10, 12 and 13, and immediately place implants in those respective sites. Provide a provisional restoration the same day of surgery that would be held in position using teeth #'s 11, 14 and one of the three implants that had the most initial stability. In this particular case it would be the lateral # 10 position. In addition, close attention would be paid to the bony architecture and papillae to control the ultimate esthetics of the final result.

The patient chose option 2 [figs. 1-10].

Case 2

This 43 year-old female patient presented with a symptomatic non-vital tooth # 7 . After periodontal treatment with antibiotics for three weeks, the symptoms subsided but recurred about three months later. It was explained that the tooth would have to be extracted and that ideal esthetics would require the implant be placed simultaneously with a soft tissue graft to insure tissue preservation. Without a tissue graft we would have had the implant placed too apically leaving the patient with a gingival defect and uneven non-esthetic gum line. This patient had a very high smile line. With same day placement of both the implant and graft, we could not immediately place a provisional, even though the implant was highly stable [figs. 11-16].



fig. 11- Pre-operative radiograph. Interproximal peak of bone is intact. This is a critical factor in determining loss of interdental papillae.

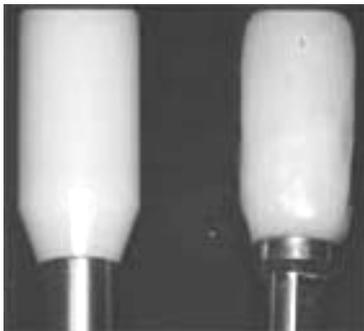


fig. 14 - Ceramic abutment prepared in laboratory . This shows the difference between empress build up of abutment [left] and stock ceramic abutment.

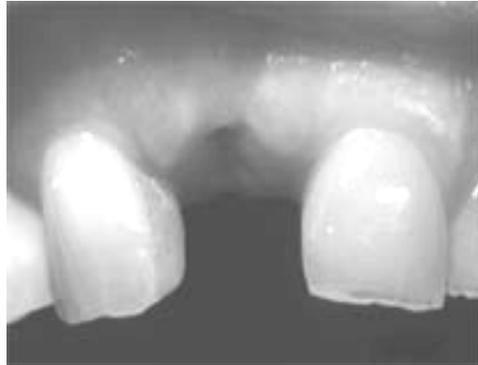


fig. 12 - This shows 4 weeks post implant placement. Patient wore removable flipper as the provisional.

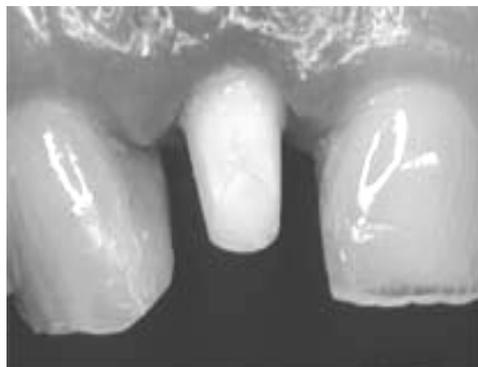


fig. 15 - Ceramic abutment placed onto implant fixture. Fine tuning preparation and fabricating provisional restoration. Waiting 3 weeks and making final impression.



fig. 13 - After uncovering of implant. Final impression at implant fixture level.



fig. 16 - Insertion of Empress crown with Nexus cement.

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