



## Contemporary Implant Dentistry & Removable Prosthodontics

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### Educational objectives:

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

- Fully understand the various available treatment options for edentulous patients today and how they differ.
- Get a better grasp on the technical aspects of available implant retentive components and understand their similarities and differences.
- View side-by-side comparisons of available individual implant abutment components and how they differ in terms of durability and flexibility with respect to angulation concerns, interchangeability, etc. when restoring dental implants in edentulous patients.
- Illustrate various “tips and techniques” which will aid practitioners in implementing these implant restorative procedures.
- Get additional information on the specifics of a particular attachment system as related to its usability in individual locations as well as a part of a superstructure and the mechanics involved thereof.

### Abstract

Many of the available techniques and concepts for employing dental implants into treatment for both partially and fully edentulous patients are covered in the following article. Particular emphasis is placed on the application of using individual implant retentive abutments as the primary means of affording optimal stabilization for removable prosthetics, whether used in a free standing manner or as part of a bar system.

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*Instructions on how are on page 82.*



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For scores of years, mainstream dentistry has treated partial and total edentulism in what could be referred to as conventional care. When I graduated from Louisiana State University School of Dentistry in 1980, I was troubled by the limitations of conventional treatment. Patients' frustrations eventually became my own frustrations – not having anticipated that these prosthetic devices I'd labored to produce for my patients were inadequate in so many ways and for so many reasons. In addition, the obvious limitations both esthetically and functionally became more and more blatant as we followed these patients for years to come. Loose "false teeth" resulting from inevitable bone disuse atrophy and the need for relines, remakes, neutral zone technique, adhesives, soft liners, and so forth afforded some remedy – but not really enough. In addition to this instability was the fact that, patients would invariably experience facial collapse, food entrapment, soreness, blisters, angular cheilosis, inability to chew foods properly and premature wrinkling.

Loosening and/or loss of abutment teeth supporting conventional as well as precision removable partial dentures presented with continued care and maintenance for these patients, which often meant adding teeth to existing partials as a result of abutment tooth failures, clasp breakage, need for remakes, etc. All the while, problems associated with dietary limitations, sore spots, embarrassment, self-consciousness, feelings of fullness, fear of being noticed, etc. were just "part of the deal." Dentures were much akin to "glass eyes" in that they might look authentic, but the functional capacity of these prosthetic appliances was far from the "patient's original equipment" even in the best of circumstances.

Only after dentistry began to fully embrace dental implantology as predictable option and alternative to conventional care did hope for this large number of patients begin to shine through and offer far superior functional reconstructions for patients missing anywhere from one to all of their teeth. So typical nowadays is the middle-aged patient who comes into the office with a Panorex that looks like a "train wreck"—e.g. missing teeth, periodontal defects, multiple teeth with endodontics/post and cores/crowns, recurrent decay, "patched up" removable partial dentures, infected root canals, and other failing dentistry. Typically, the patient is beginning to realize the truth of the old saying: "The definition of insanity is doing the same thing over and over again expecting different results." These patients generally are looking for a treatment option other than relying on teeth that have been worked on numerous times and continue to plague the patients with recurrent problems. For example, figure 1a and b are of a patient who was a clear candidate for implant therapy, versus "keeping her lower teeth" and attempting to restore them.

Implant dentistry has allowed us to rely on a biocompatible entity that literally fuses to bone, does not decay, has no pulp that is susceptible to heat and cold sensitivity or necrosis, and doesn't fracture in ordinary circumstances. As we study long-term clinical data in combination with our own experiences, we now have new challenges and tasks at hand when it comes to treatment planning patients, which includes making decisions about "keeping or extracting" teeth with high-risk profiles as described by Dr. John Kois. Kois has suggested that in the course of treatment planning a tooth, a quadrant or an arch, we need to itemize the positives and negatives associated with each individual tooth in helping us to make good decisions that will affect the long-term prognosis for the patient. For instance, a tooth that has had endodontic therapy, has decent bone support, but has very little if any ferrule—is this really a good candidate for serving as part of a fixed bridge, or even supporting a single crown in the long run? Is this patient a bruxer? How does this tooth fit into the overall scheme of the dentition? These are a few of the questions we should ask ourselves when trying to decide if a tooth should be "saved" versus sacrificed and replaced with a dental implant.

In reviewing all of the treatment possibilities available for the partially and fully edentulous patient when utilizing dental implants, decisions must be

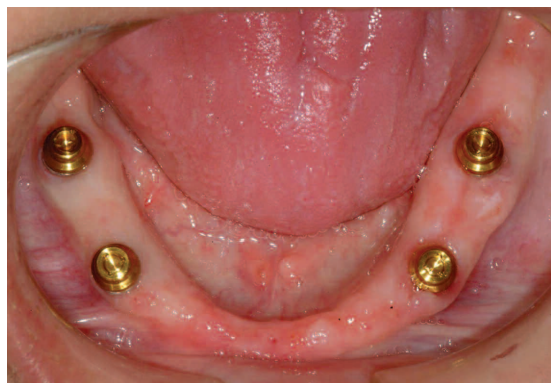
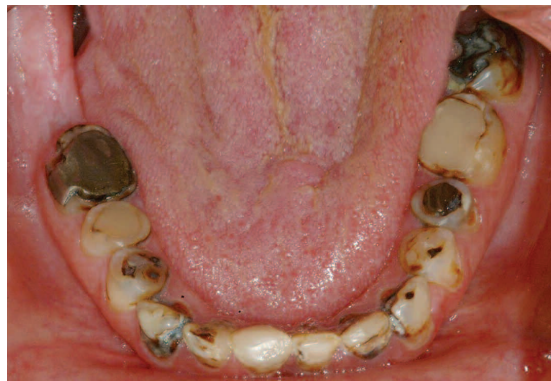


Figure 1a & 1b



Figure 2: (L-R) 3.17 mm Locator, 4.85 mm ERA, 5.82 mm Dal-Ro, 6.14 mm O-Ring and 6.22 mm EDS



Figure 3: (L-R) Process 8515, 5 lbs. 8524, 3 lbs. 8527, 1.5 lbs. 8529, 4-3 lbs. 8547 (angled) and 1.5 lbs. 8518 (angled)

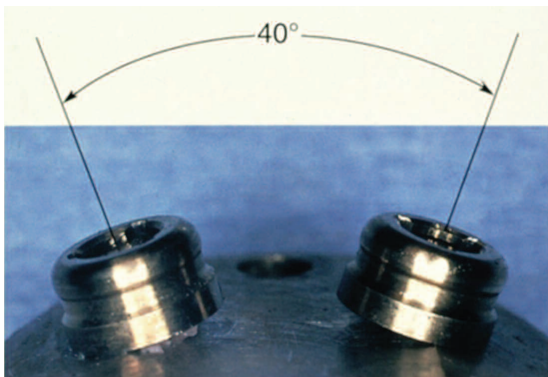


Figure 4: Ability to handle divergence of implants up to 40 degrees

thoroughly investigated so the ultimate treatment solution is satisfactory in accord with the individual patient's expectations. In addition, it also is important that these decisions follow sound prosthodontic principles as well to ensure long-term, successful outcomes.

We have to decide on the number of implants that will be employed in a given edentulous arch, for instance. We also have to decide on whether or not we can utilize individual abutments such as O-ring abutments, ERA abutments, Locator abutments and others (Fig. 2) versus using a bar/clip system for retaining the prosthesis. Compared to an implant connecting bar, the use of individual implant abutments/attachments offer the advantages of being less costly to restore the case, of having fewer steps needed in order to achieve final results, of having a stronger overdenture plus adjustable and durable retention. Additionally, fewer problems are associated with the lack of vertical space and with food entrapment. Nowadays, there also is the option for some patients for use of mini implants in particular in the mandibular arch. Mini implants usually are composed of an O-ring ball on the single mini implant and a rubber O-ring with a housing that is ultimately incorporated into the patient's overdenture. Mini implants can be used to stabilize a mandibular denture when adequate amounts of vertical bone height and width are evident. They also provide a less invasive approach to implant therapy, which is particularly useful for medically compromised patients or those who can't afford conventional implant therapy. We also have the option of fixed/detachable hybrid acrylic bridges as well as fixed cemented bridgework for some patients as well. Furthermore, it is extremely important that patients be educated to a level of understanding sufficient for making informed decisions, when it comes to ultimately deciding the route of treatment that they will consider, and the financial obligations for the individual patient must be practical and affordable.

After having used practically every imaginable system of bars and attachments for edentulous patients over the course of the past 21 years, this author's favorite system is the Locator abutment system (Zest Anchors, Inc.). It is a very versatile system that is self-aligning, allows for variable degrees of retention (Fig. 3) and it has the lowest profile of all available implant abutment systems on the market today. This is especially important for those patients who have minimal interocclusal space available for the implant abutment, housing and overlying acrylic resin and denture teeth. In addition, the Locator system works very well even when the implants are not perfectly aligned up to 40 degrees divergence as pictured in figure 4. It can be used on individual implants or on bars/frameworks. Zest also offers a "Three in One" tool that can be used for placing the various inserts into the Locator housings, for removal of the inserts, as well as for insertion and torquing of Locator abutments when used in combination with a 0.50 hex insert and conventional torque wrench.

Because the Locator abutment can serve as a screw-in implant abutment, can be "cast to," or can be secured into drilled and tapped section of an implant supported bar, this system offers the maximum in terms of flexibility. When the individual implant Locator abutments are utilized, it is this author's experience that the most accurate method for incorporating the Locator housings into the patient's new or existing prosthesis is through the use of visible light cured (VLC) resin versus using autopolymerizing resin. In using VLC, the dentist decreases the unpleasant taste and burning sensation that is typical of most acrylic resins. More importantly, the dentist lessens the chance that the prosthesis will lock in causing difficulty in removal as VLC resins do not shrink much when cured, nor do they adhere to the surrounding hardware as can be the case with autopolymerizing resins. VLC resins also lessen the "time factor" and urgency and help prevent attachment dislodgement when seating the prosthesis into place.



Figure 5a & 5b



Figure 6a: (Left) 2.0mm Castable Threaded Insert No. 8014

Figure 6b: (Right) 2-56 Castable Threaded Insert No. 8013

When “picking up” O-ring housings for mini implant cases with either acrylic autopolymerizing resin or light cured resin, clear silicone sleeves are essential in preventing the material used from “locking onto” the implant necks just below the ball of the O-ring and its housing.

Usually, using Locator implant abutments in the lower arch will afford sufficient stability and retention to satisfy even the most discerning and demanding dental patient, such as in figures 5a and 5b. In cases where splinting of the implants is desired, such as in many maxillary cases, an implant supported bar incorporating the threaded portion that receives the Locator bar abutment is an optimal solution. This Locator Bar system actually offers four different options with regards to incorporating the attachment into a cast metal bar. A castable threaded insert can be incorporated into a bar pattern prior to casting for a removable threaded Locator Bar Female connection. In the case where the bar has already been cast, a drill and tap from Zest Anchors specific for the 2 mm type or the 2/56” type can be utilized for producing a threaded Locator Bar Female. In addition, they can be laser welded to a bar or one also may utilize a cast-to the stainless steel Locator attachment in which the bar pattern is waxed directly to the housing. However, the distinct advantage to having threaded patterns (Figs. 6a, b) is that over time, should some degree of wear occur with the Locator male, it can simply be unscrewed from the bar and another torqued into its place. It is very important to mention that when an attachment of any type is either cast-to or is waxed and cast as part of a bar, the best method of divesting and polishing it after recovery from the investment would be glass bead blasting.

With our main objections in implant dentistry being functional and esthetic improvements for patients, dentists also must consider techniques for expediting these tasks with emphasis on efficiency and accuracy. One of the best ideas this author has found was the use of a denture duplicator technique for copying the patient’s existing dentures, which in turn would function as a combination of custom impression trays and occlusion rims. The Denture Duplicator (Lang Dental Manufacturing Co.) allows for us to make a carbon copy of an existing upper or lower denture (or both), which in turn can be used for the patient’s final impression and bite registration simultaneously. It also allows us to duplicate the patient’s existing prosthesis for fabrication of an implant surgical stent as well as having a spare in case of an emergency. In doing so, the following information is obtained for the laboratory:

1. Position of the incisal edges of the maxillary and/or mandibular teeth.
2. Shape, size and form of the anterior teeth.
3. Midline position.
4. Vertical dimension of occlusion.
5. Plane of occlusion.
6. Size and shape of the existing prosthesis as well as the thickness.
7. Interincisal relationship (overjet and overbite)

Obviously, if the patient wants any particular changes from his/her existing dentures, notations are added to the laboratory prescription to help the lab visualize the final setup for the esthetic try-in. In many cases, the esthetic try-in and bite verification goes very smoothly and eliminates much of the guesswork involved when employing the more conventional wax rim/occlusion rim scenario. Denture duplicates are made using conventional irreversible hydrocolloid in the duplicator and the mold is poured with conventional cold cure pink acrylic. After recovery, great care is taken to make certain that the intaglio of each duplicate is free of spicules and sharp edges, so as not to cause discomfort to the patient during the final impression with PVS impression material. Also, if for example, the patient has Locator attachments in place in the mouth, the attachment housings are snapped onto the Locator abutments in the mouth, adequate relief is accomplished with a straight handpiece and large

round acrylic burs and verified with Fit Checker from GC America, Inc. Here we simply want to make certain that the denture duplicate isn't being held up off of the tissue by the attachment/abutment combination bottoming out in the duplicate. In addition, any gross anterior or posterior occlusal interferences also are equilibrated to try and achieve maximum intercuspation between the duplicate and the opposing dentition or between upper and lower duplicates, if that is to be the case. Once passivity is ensured, PVS adhesive is painted into the duplicate(s) and a closed-mouth impression is taken. Prior to removal of the duplicate(s), a facebow is taken, and then bite registration material is injected onto the occlusal surface of the upper arch and the patient is manipulated into centric occlusion. After removal from the mouth, the duplicate(s) is poured and the case is mounted onto a semiadjustable articulator. The case along with notations is sent to the laboratory. The following appointment will be the patient's esthetic try-in and bite verification visit.

In conclusion, as human beings, it seems that we really cannot fully appreciate anything until it's lost or gone. Whether it's our eyesight, a parent, or something as simple as a smile or eating an apple—we take most of what we have for granted without even being aware of it. The dental profession has struggled admirably for decades in trying not only eliminate dental diseases, but also in attempting to restore fellow human beings back to optimal states of function, comfort and esthetics. The advent of dental implants has been a gift to our profession and to those patients we care for in the ever evolving field of permanent tooth replacement. Although the statistical data bears out the claims for long-term success, the ever vigilant profession of dentistry will hopefully continue to march forward in the development of even better and hopefully more affordable and therefore more universally applicable implant surgical and restorative systems. Implant dentistry has arrived and is definitely here to stay.



Figure 7



*This CE activity is supported by an unrestricted grant from Zest Anchors, Inc.*



*Dr. Smith has practiced general dentistry in Lafayette, Louisiana since 1980. He began surgical placement and restoring implants starting in 1985 and has since limited his dental practice to dental implantology. He works with over 90 general practitioners and specialists throughout the state of Louisiana. He has also authored several publications regarding restoring implants and conducts in office training periodically. Dr. Smith can be contacted via e-mail at [jerome@jeromesmithdds.com](mailto:jerome@jeromesmithdds.com) or phone at (337) 235-1523.*

*Disclosure: Dr. Smith declares that neither he nor any member of his family have a financial arrangement or affiliation with any corporate organization offering financial support or grant monies for this continuing dental education program, nor does he have a financial interest in any commercial product(s) or service(s) he will discuss in the presentation.*

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## Post-test

1. Which of the following is NOT a consequence of edentulism/tooth loss:
  - a. Collapse of the face
  - b. Osteoporosis
  - c. Ill-fitting removable complete or partial bridges/dentures
  - d. Soreness, blisters, food entrapment
  - e. Inability to properly chew foods for proper assimilation by the digestive system
  - f. "Premature aged appearance"
  - g. Wrinkling, especially around the lips in the lower face
2. Which statement regarding mini-implants is NOT correct:
  - a. Mini implants can be used to stabilize a mandibular denture when adequate amounts of vertical bone height and bone width are evident
  - b. Mini implants provide a much less invasive approach to implant therapy, which is particularly useful for patients who are medically compromised and/or cannot afford conventional implant therapy
  - c. Mini implants usually are composed of an O-ring ball on the single stage mini implant and a rubber O-ring with a housing that is ultimately incorporated into the patient's overdenture
  - d. Mini implants offer patients maximum stability as opposed to other available implants and retentive abutments
3. The Locator Attachment System from Zest offers the following advantages:
  - a. Various degrees of retention available for each abutment (color coded)
  - b. Has a notable self-aligning feature
  - c. Can be used on individual implants or on bars/frameworks
  - d. Can accommodate an angulated root or implant with up to 30 degrees of angulation
  - e. a, b, and c
4. When an attachment of any type is either cast to or is waxed and cast as part of a bar, the best method of divesting it and polishing it after recovery from the investment would be:
  - a. Conventional sandblasting (30 micron particle)
  - b. Iontophoresis
  - c. Glass bead blasting
5. The 3 in 1 tool that is utilized with the Locator attachment can be used for the following purposes:
  - a. Burnishing the housing
  - b. Insertion of the Locator colored attachment
  - c. Removal of the Locator colored attachment
  - d. Insertion and torquing of the Locator abutment when used with a 0.5mm hex tool and torque wrench
  - e. b, c, and d
6. The Locator female attachment allows for four adaptations in implant dentistry for unprecedented versatility in both implant and tooth borne removable prosthodontics. These include:
  - a. Castable threaded insert into a bar for a removable threaded Locator Bar Female connection
  - b. Drill and tap the bar for a threaded Locator Bar Female
  - c. Laser weld a Locator Laser Bar Female to the bar
  - d. Cast-to the stainless steel Locator Cast-To Bar Female with gold alloy
  - e. a, b, c and d
  - f. All of the above
7. Among the disadvantages of using autopolymerizing acrylic resin for "picking up attachments" into full and partial overdentures are:
  - a. Unpleasant taste and possible burning sensation from acrylic monomers
  - b. Possible attachment displacement when seating the prosthesis
  - c. Time factor and urgency when seating the prosthesis as the acrylic begins to set up
  - d. Possibility that acrylic will bond to undercut areas and thus "lock in" making retrieval difficult if not impossible
  - e. all of the above
8. When "picking up" O-ring housings for mini implant cases with either acrylic autopolymerizing resin or light cured resin, these items are essential in the prevention of material used "locking onto" the implant necks just below the ball of the O-ring and its housing:
  - a. White Teflon block out spacer
  - b. Black, red or white rubber O-rings
  - c. Clear silicone sleeves
9. The use of individual implant abutments/attachments such as ERA, Zest Locators, O-rings, etc. offer the following advantages over an implant connecting bar:
  - a. Much less costly to restore the case
  - b. Fewer steps in achieving the final result
  - c. Stronger overdenture due to lack of "hollowed out area" in the respective overdenture
  - d. Adjustable, durable retention
  - e. Fewer problems associated with "lack of vertical space" for appliance fabrication and ultimate durability
  - f. Fewer problems with food entrapment because the denture base is in full contact with the tissue surface compared to the "hollowed out design" used in bar overdentures
  - g. All of the above
10. The Lang Denture Duplicator is an invaluable tool in the dental office that offers both removable prosthodontics as well as dental implants for its patients. Among the many uses for this device includes:
  - a. Duplication of the patient's existing prosthesis for fabrication of an implant surgical stent
  - b. Duplication of the patient's existing prosthesis to be used as a custom impression tray/occlusion rim for making a new prosthesis
  - c. Duplication of the patient's existing prosthesis in fabricating a spare for emergencies
  - d. a and b only
  - e. All of the above