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## c.e. article

Esthetic replacement  
of maxillary premolar  
with immediate  
implant placement

## events

AAID presents  
conference on  
'Managing Bone  
Deficiencies'

## industry

The iSy system offers  
'true flexibility' for  
variety of treatments

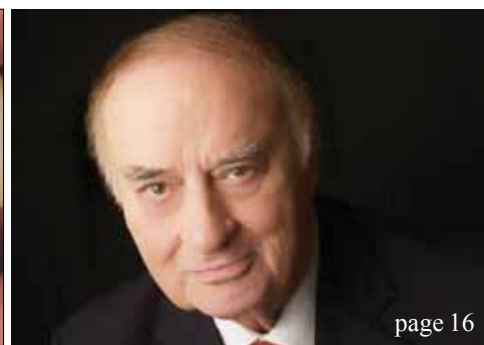




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# Why choose between stability and easy maintenance?

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# Esthetic replacement of maxillary premolar with immediate implant placement and metal ceramic crown over CAD/CAM abutment

**Author** \_Larry R. Holt, DDS, FICD

## \_c.e. credit part I

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\_This article describes treatment to solve a common dental complication (loss of tooth due to vertical root fracture). Contemporary implant therapy and subsequent CAD/CAM laboratory procedures provide an elegant solution to this patient's dental emergency. Treatment was accomplished during a period of approximately six months.

The patient is a healthy, 52-year-old female with an unremarkable medical history. Her dental history and general dental health are excellent. Unfortunately, she suffered a vertical fracture of tooth #5, which necessitated its extraction (Fig. 1).

The treatment plan was for extraction and immediate implant placement with concurrent bone grafting as required. A temporary partial was planned to provide esthetic replacement and to support and shape tissue during the healing process. Final restoration was to be a cemented PFM crown supported by an Atlantis gold hue abutment.

Material selection was based on patient's cross bite occlusion that transitions from normal to cross bite across this particular tooth's occlusal table. Crown and abutment could potentially be subject to occlusal stress due to this transitional relationship.

A restoration that provides maximum strength was desirable for long-term stability of the restoration.

The patient has a thin biotype, and the gold hue abutment provides both strength and the gold color that provides a more natural tissue color.<sup>1</sup> The gold color provides "warmth" of color in the critical transmucosal region. Titanium abutments provide strength but can telegraph a greying affect on thin tissues.

Treatment began with a preoperative appointment to take necessary records (impressions of both arches, facebow transfer, shade taking, bite registration and clinical photography).

Prescription to lab was provided ordering a partial denture fabricated from duracetyl resin and to develop a tooth born surgical guide. Lab was instructed to simulate the extraction site by removing the tooth from the study cast provided. This model was duplicated for fabrication of the two appliances.

Laboratory product was provided to surgeon. Atraumatic extraction was accomplished and immediate implant (Legacy Three, Implant Direct) placed with facial bone grafting (Figs. 2-3).

There was a healing screw placed and site was closed with appropriate membrane and suturing techniques. The unilateral partial was not delivered at time of surgery. Patient was seen in restorative office, and the partial (Duratek, Drake Precision Laboratories) was modified to provide tissue support

**Fig. 1** \_Fractured tooth.  
(Photos/Provided by  
Dr. Larry R. Holt)



**Fig. 2** \_Immediate implant  
placement.





Fig. 3



Fig. 4



Fig. 5



Fig. 6

and begin development of an ovate tissue site. Partial was delivered uneventfully. These appliances are extremely retentive and not subject to dislodgement or pressure over the implant site during function. Patient was seen at one week for postoperative check and adjustment of temporary appliance (Fig. 4).

Patient was instructed to return to surgical clinic in approximately four months for final evaluation prior to restorative procedures.

Four months after surgery, the patient was seen by surgeon to uncover the implant, remove the healing screw and place a temporary abutment. The temporary partial was adjusted to accommodate the added height of the healing abutment (Fig. 5). Patient was



Fig. 7

**Fig. 3\_** Bone grafting and membrane placement.

**Fig. 4\_** Temporary Duratek partial.

**Fig. 5\_** Healed implant site with healing abutment.

**Fig. 6\_** Well-healed mucosa.

**Fig. 7\_** Placement of impression coping.

**Fig. 8\_** Final PVS impression.

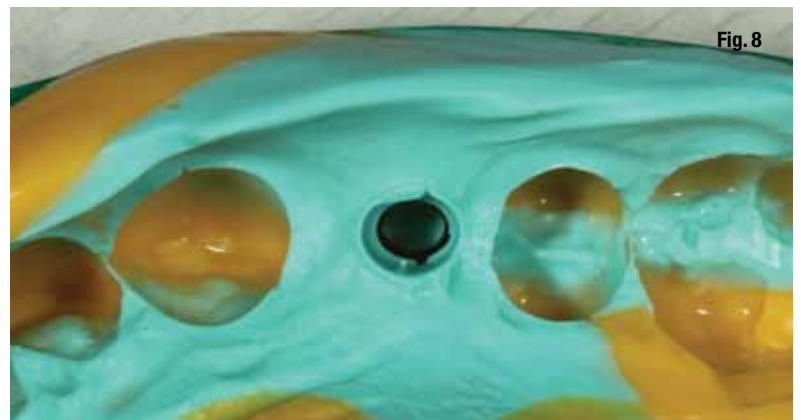


Fig. 8



Fig. 9

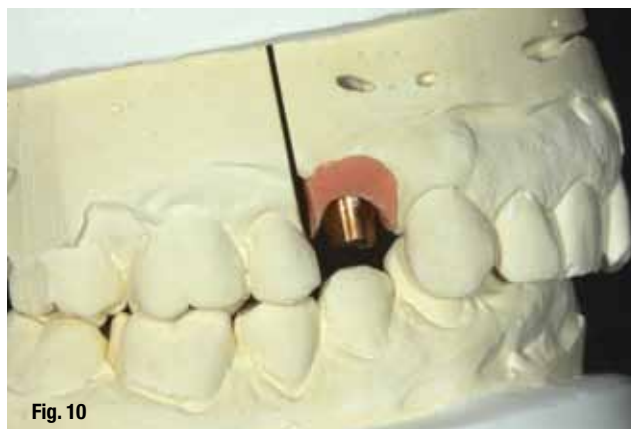


Fig. 10



Fig. 11



Fig. 12

**Fig. 9\_** Crown and abutment on analog model.

**Fig. 10\_** Gold hue Atlantis abutment on analog model.

**Fig. 11\_** Gold hue Atlantis abutment in place.

**Fig. 12\_** Cementation jig.

instructed to return to restorative office for definitive restoration of the implant in approximately three weeks.

Patient was appointed with restorative office for evaluation and to develop necessary records for laboratory fabrication of the definitive restoration. Implant site was evaluated and deemed adequately healed to proceed with restorative procedures (Fig. 6).

Healing abutment was removed and a closed tray impression coping was fitted onto the implant (Fig. 7). Radiograph was taken to confirm complete seating of the impression coping. A full-arch impression was taken with heavy body PVS impression material (Panasil TraySoft, Heavy Body Regular Set, Kettenbach GmbH) (Fig. 8).

Healing abutment was replaced once impression was taken. A bite registration (Futar D Fast Set Kettenbach GmbH), new opposing impression (Silginate plus Panasil Light Body Fast Set, Kettenbach GmbH) and shade map were taken. All clinical product was sent to laboratory along with shade photography and a complete written prescription. A PFM high noble crown and Atlantis gold hue custom abutment were prescribed. The abutment was ordered as tissue contouring with 1 mm deep margin placement circumferentially (Atlantis, Dentsply Implants).

The use of a custom abutment allows modification of transmucosal tissue profile and to ideally position margins. Tissues were previously shaped with the ovate pontic of the temporary partial. The final crown

was planned to be chairside custom stained. Lab was cautioned that occlusion on this restoration was in the path of patient's crossbite transition from normal to crossbite.

The laboratory (Drake Precision Dental Laboratories, Charlotte, N.C.) partnered with Atlantis (DENTSPLY Implants) for abutment design and milling and then fabricated the PFM crown (Figs. 9-10). The patient was appointed for definitive restoration delivery.

Delivery appointment was uneventful. Healing abutment was removed and the Atlantis abutment was placed (Fig. 11). Because of positive tissue pressure from tissue contouring, the abutment was slowly placed with incremental turns of the retention screw. Tissue blanching was carefully observed.

The abutment was fully seated and, within five minutes, tissue blanching had disappeared. The Atlantis abutment was torqued to manufacturer's specifications (30 Ncm). A radiograph was taken to confirm final seating of the abutment.

The PFM crown was tried on and interproximal contacts adjusted to allow complete seating of the crown. Occlusion was marked with appropriate articulation ribbon and adjustments were accomplished, with particular attention to functional path and centric contacts.

The final occlusion respected the cross bite while providing a light occlusal contact that became normal in intensity upon biting force.<sup>2</sup> All functional contact was adjusted to be in minimal contact during excu-





Fig. 13



Fig. 14



Fig. 15

sions. Adjacent teeth provided partial group function.

Once all clinical adjustments were done, a laboratory technician was consulted for final shade matching. The initial shade was very close to ideal. The technician accomplished minor modifications (minimal characterization staining and reduction in final surface gloss). Proximal contacts and occlusal table were polished after final glazing.

The crown was lined with silicone tape and then bite registration material was injected into the crown to fabricate a cementation jig (Fig. 12).<sup>3</sup> This step is very important to avoid excess cement extrusion during final seating of the restoration.<sup>4</sup>

All pre-cementation procedures were completed, including approval by patient of both esthetics and bite comfort. Abutment screw access hole was sealed with silicone tape, respecting the external contours of the abutment to allow complete seating of the restoration. This is a critical step to maintain patency for future access to retention screw.

The crown was steam cleaned and thoroughly dried. Intraorally, the abutment was thoroughly cleaned and dried in preparation for cementation procedures. Attending dental assistant maintained cheek retraction and dry field.

The walls of the crown were lined with implant cement (Dental Implant Cement, radiopaque, Premier). The crown was then seated on the previously fabricated cementation jig to extrude excess cement. Cement adaptation to internal walls of crown was confirmed and the crown was seated over the custom abutment. Excess cement was removed by combination of hand instrumentation and dental floss after initial cement setting.

The crown was left under biting pressure with cotton roll over occlusal table for five more minutes to allow for cement to fully set. Meticulous inspection of sulcus was accomplished to remove any vestige of implant cement. Postoperative radiograph was taken to evaluate complete seating of crown and to confirm removal of any excess radiopaque cement. Occlusion was confirmed and patient was dismissed. One-week recall was accomplished to confirm occlusion and to reevaluate soft-tissue

response to the restoration.

This case study reveals the potential for implant-supported tooth replacement. Esthetic result was excellent, and final gingival contours were consistent with adjacent dentition. The tissue color was natural and did not reveal any hint of the underlying implant or abutment. Restoration margins were concealed within the gingival sulcus. This treatment provided an elegant solution for this all-too-common dental emergency. The patient was extremely pleased with the result (Figs. 13-15).

*Note: The author would like to express gratitude to Drake Precision Dental Laboratories (Charlotte, N.C.) for all services provided for this treatment. In addition, Dr. Todd Engle, DDS, (Charlotte, N.C.) provided extraordinary care during extraction and immediate placement of implant.*

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**Fig. 13**\_Final patient lateral smile.

**Fig. 14**\_Final restoration retracted.

**Fig. 15**\_Final restoration occlusal view.

## \_about the author



Larry R. Holt, DDS, FICD, graduated from the UNC School of Dentistry in 1978. He was in private practice from 1978-2008. Since 2008, he has been the director of clinical education and research at Drake Precision Dental Laboratories in Charlotte, N.C.

# Fixed and removable implant restorations: A solution for every arch

Author\_Paresh B. Patel, DDS

## \_c.e. credit part II

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When a patient presents with an edentulous arch or terminal dentition, implant treatment can be provided that improves not only form and function but also quality of life. For patients desiring better chewing capability, stability, esthetics and comfort than a traditional denture can offer, both removable and fixed implant restorations are superior alternatives.<sup>1</sup> While the appropriate implant solution can vary depending on the patient's oral health, anatomy, quality and quantity of bone, and financial resources, full-arch prosthetics have progressed to the point where virtually every patient can be restored.

Although fixed, implant-supported restorations offer the highest levels of stability, function and patient satisfaction, removable overdentures are a dramatic improvement over conventional complete dentures as well.<sup>2</sup> Both treatment options effectively mitigate the bone resorption that occurs following the loss of teeth, helping to preserve the oral and facial structures and, by extension, the self-confidence of the fully edentulous patient. Determining which solution is appropriate requires a careful evaluation of the individual patient's circumstances and desires. Even when an implant overdenture is delivered, the prosthesis can eventually be converted to a fixed restoration.

As evidenced by the case that follows, in which one arch is restored with an implant overdenture and the other with a BruxZir® Full-Arch Implant Prosthesis, practitioners today have a great deal of clinical flexibility. Whatever prosthetic approach is adopted, immediate, life-changing relief can be provided to patients suffering from terminal dentition or an uncomfortable, poorly functioning traditional denture. Further, the dramatic overhaul of this patient's oral health demonstrates the life-changing capabilities of implant therapy,

which helped him overcome severe functional and esthetic challenges that were impacting practically every facet of his life prior to treatment.

## \_Case presentation

A 47-year-old male presented with terminal dentition in both arches resulting from periodontal disease and severe caries (Figs. 1a–1c). The patient had already lost many of his teeth, and the dentition that remained had been rendered unstable by his periodontal condition (Fig. 2). He had saved up enough money for a fixed implant restoration for his upper arch, for which he desired the most functional, lifelike prosthesis possible. While he couldn't afford such a restoration for both arches, he wanted a retentive appliance for his mandible, with the option of later upgrading to a fixed prosthesis.

The patient accepted a treatment plan in which his maxilla would be restored with a BruxZir Full-Arch Implant Prosthesis and his mandible with an Inclusive® Locator Implant Overdenture. Fabricating his maxillary restoration from monolithic zirconia would ensure maximum long-term durability. This was important provided the relatively young age of the patient, who would not have to worry about his upper prosthesis succumbing to fractures, chips or stains.

His lower appliance would be held in place by connecting to the implants via Locator® attachments (Zest Anchors; Escondido, Calif.), which are an economical means of improving prosthetic retention and stability. The overdenture caps that connect to the Locator attachments would be incorporated in the prosthesis chairside, though it should be noted that many clinicians elect to have the laboratory handle this step.

The surgical phase of treatment called for the ex-





Fig. 1a



Fig. 1b



Fig. 1c



Fig. 2



Fig. 3



Fig. 4a

**Figs. 1a–1c**\_Preoperative condition of the patient. Note the high lip line, severe cervical decay present on the patient's remaining teeth and lack of gingival support. (Photos/ Provided by Dr. Paresh B. Patel)

**Fig. 2**\_Preoperative panoramic X-ray exhibits periodontal disease, cervical caries, terminal state of the patient's dentition and the compromised state of the surrounding periodontium, which had rendered the teeth mobile.

**Fig. 3**\_Maxillary implants with parallel pins in place exhibit the axial placement of the anterior implants and the tilted angulation of the posterior implants.

**Fig. 4a**\_Inclusive Tapered Implants by Glidewell Direct.

traction of the patient's remaining teeth followed by the immediate placement of eight dental implants. CBCT scans were taken to help determine the optimal placement of the implants within the available bone and away from the patient's vital oral anatomy. Evaluation of the CBCT scan determined that there was sufficient height, width and quality of bone to place the implants in the appropriate locations and angulations via freehand surgery. Four 3.7 mm Inclusive Tapered Implants (Glidewell Direct; Irvine, Calif.) would be placed in each arch to support the fixed maxillary restoration and the removable mandibular prosthesis.

At the surgical appointment, the patient's remaining teeth were removed, and a flap was raised to visualize the socket sites and areas of implantation. Bone leveling was performed on the patient's maxillary arch to elevate the patient's smile transition line above the upper lip.

The maxillary osteotomies were positioned to facilitate an All-on-4 configuration, with the

posterior implants tilted to maximize the anterior-posterior (A-P) spread, avoid the sinuses and accommodate the patient's bone limitations (Fig. 3). Osteotomies were created for the placement of four mandibular implants, as opposed to the minimum of two required for a Locator overdenture. This would enhance retention of the overdenture while affording the possibility of upgrading to a fixed restoration at a later time.

Following creation of the osteotomies, the implants were placed (Figs. 4a–4c). Inclusive Multi-Unit Abutments (Glidewell Direct) were attached to the maxillary implants, correcting for the divergent angulation of the implants. This would both position the restorative platform in a manner that would situate the screw access holes of the eventual prosthesis toward the lingual aspect and allow for a molar-to-molar restoration (Fig. 5).

Note that when patients present for treatment with terminal dentition, they are commonly anxious about losing their teeth and the effect this