

# Therapeutic Management for Immediate Implant Placement in Sites with Periapical Deficiencies Where Coronal Bone Is Present: Technique and Case Report

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*A surgical approach is presented that enables the clinician to repair apical bony defects during immediate dental implant placement without compromising the integrity of the coronal bone and gingiva. This apical surgical technique retains the soft tissue form in the coronal aspect of the gingiva and allows the clinician to repair the apical bone loss or fenestration. A clinical case is presented to describe the technique. This technique is utilized in cases of immediate implant placement. After extraction of the tooth, the socket is evaluated. In cases where coronal bone is intact but apical bone is deficient, a flap technique is utilized to expose the defect. The implant osteotomy is prepared, and the implant is placed. A healing cap or gingival prosthetic component is connected. The bony defect is repaired with a bone graft and, where necessary, a membrane. The apicoectomy flap is sutured. The clinical results obtained using this technique will enable the clinician to accomplish the bone regenerative procedure without extending the flap to the coronal aspect of the socket during immediate implant placement. This technique assists in the maintenance and integrity of the soft tissue form, which is critical for optimal esthetic results. (Case Report) INT J ORAL MAXILLOFAC IMPLANTS 2006;21:476-480*

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Successful osseointegration of implants has been well documented.<sup>1-6</sup> After Albrektsson and colleagues proposed criteria for the success of osseointegrated endosseous implants,<sup>4</sup> Smith and Zarb added esthetic restoration as a criterion for success.<sup>7</sup>

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One of the most challenging procedures in implant dentistry is replacement of teeth in the esthetic zone. Development of an esthetic restoration that matches the adjacent natural dentition, with soft tissue in harmony with the dentition, has become the focus of many disciplines in implant dentistry.<sup>8,9</sup> Evaluation of the periodontal form is critical to achieve an esthetic result. This is even more essential in patients with the thin, scalloped gingival type.<sup>10-12</sup> Therefore, presurgical treatment planning for implant placement is important to improve predictability with respect to function and esthetics.<sup>13</sup>

Following tooth loss the alveolar bone has a tendency to resorb.<sup>14,15</sup> In concert with bone loss, the soft tissue generally shrinks along with the bone resorption.<sup>10,14,16,17</sup> This is especially obvious in the anterior and premolar areas, where thin plates of facial bone are often present.<sup>18,19</sup> This loss of bone and soft tissue results in esthetic issues that may compromise the restorative results.<sup>20-22</sup>

Immediate implant placement after tooth extraction can facilitate preservation of the alveolar bone and soft tissue architecture.<sup>23-25</sup> Placing implants

immediately into sockets at the time of extraction or socket preservation procedures tends to assist in maintaining the bone levels.<sup>23–26</sup> Covani and associates speculated that early remodeling may start after tooth extraction and continue even after delayed implant placement.<sup>27</sup> In cases where the bone resorbs, the soft tissue tends to continue to shrink. If surgical augmentation is required, a considerable amount of additional time and effort must be expended, and additional patient discomfort may be experienced.<sup>28–30</sup> In many cases the ideal esthetic result is still not achieved.

Loss of soft tissue may also result in the replacement of the gingiva with alveolar mucosa on the facial or lingual aspects of the ridge, creating a lack of attached gingiva around implant restorations and/or significant esthetic deformities.<sup>20–22</sup> One-stage implants afford the clinician the opportunity to place implants immediately into sockets while retaining the form of the hard and soft tissue. A similar approach may be considered if a 2-stage implant is used and healing caps, abutments, or gingival prosthetic components are utilized to maintain the soft tissue topography.<sup>23,25,28,31,32</sup> Lack of bony socket integrity may be the result of periodontal disease, fractures, endodontic lesions, or physiologic lack of anatomic bone. These dehiscences or fenestrations necessitate surgical procedures and guided bone regeneration to replace the lost bone. The conventional approach of placing an implant with subcoronal fenestrations requires raising a full-thickness flap to gain access to the apical aspect of the implant site to perform the bone augmentation. This coronal incision of the gingival tissue, although a very effective way to deal with the apical problems, may compromise the esthetic outcome of the coronal gingival form.

This article describes a surgical technique for immediate implant placement that preserves the integrity of the coronal gingival tissue while allowing the surgeon to repair the apical defect.

## SURGICAL TECHNIQUE

After extraction of the tooth with minimal trauma, the bony socket is carefully evaluated for the integrity of the bony walls using a small instrument or curette. If bone loss is present at the coronal aspect of the socket, a regenerative procedure is required. Under these circumstances a full-thickness mucoperiosteal flap involving the coronal aspect must be raised to repair the bony defect. However, if the coronal bone is intact and the bone loss is localized to the apical areas, then a full-thickness flap involving the coronal aspect should be avoided. Access to the apical bony defect can be achieved by

raising an apicoectomy access flap<sup>33,34</sup> without involving the coronal soft tissue (Fig 1). This type of incision should be made to provide access to the apical bony defect while retaining the coronal gingival tissue (Fig 2). The osteotomy is prepared, the dental implant is placed (Fig 3), and guided bone regeneration is performed at the apical aspect of the socket (Fig 4). The apical incision is sutured, and the gingival prosthetic component is placed (Fig 5).

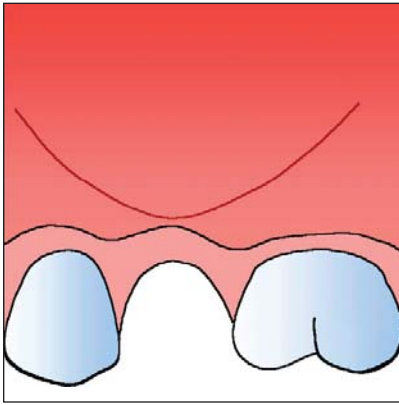
## SURGICAL PREPARATION

In the case about to be presented, the preoperative treatment included medical, dental, and periodontal evaluation. All medical needs were addressed prior to surgical intervention.

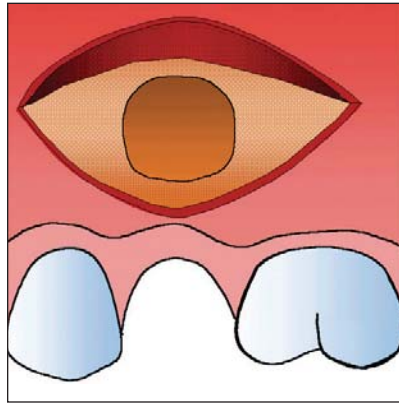
Dental and implant therapy were provided according to accepted professional protocol. The patient was placed on an antibiotic regimen 2 days prior to the surgical implant procedure. The patient rinsed with chlorhexidine for 1 minute prior to surgery. The surgical procedure was carried out under local anesthesia. The patient continued to be on antibiotic and analgesic medication for 5 to 7 days postoperatively. The patient was examined at 1 week, 1 month, and periodically until the definitive prosthesis was fabricated.

## CASE REPORT

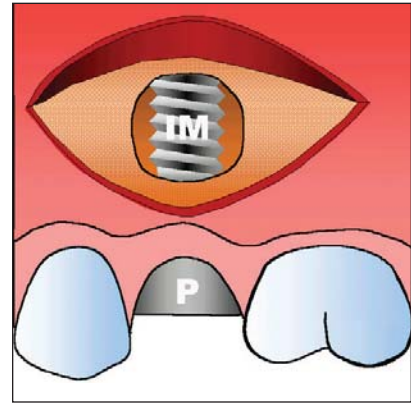
A 53-year-old female patient was referred for treatment. The patient had received periodontal therapy and dental implants in the maxillary right molar sites previously. She presented with severe periodontal problems around the maxillary right first premolar. After evaluation of the patient it was decided to extract the right first maxillary premolar and immediately place a dental implant at this site (Figs 6a and 6b). After the removal of the tooth, the bony socket was carefully evaluated, and an apical fenestration was noted. Only minimal coronal bone remained. An apicoectomy-type incision was made at the mucogingival junction. A full-thickness flap was raised, leaving the remaining coronal aspect of the gingiva intact (Fig 7). The granulation tissue was removed. A Friident XiVE dental implant (Dentsply Friident Ceramed, Lakewood, CO) was placed in the site. A healing cap was placed to help support the gingival tissue and interdental papilla (Fig 8a). The apical bony defect was then grafted with PerioGlas (Sunstar Butler, Chicago, IL) and PepGen p-15 (Dentsply Friident Ceramed) (Fig 8b). A resorbable membrane, Epi-Guide, was used as a barrier (Kensey Nash, Exton, PA) (Fig 8c). Flap closure



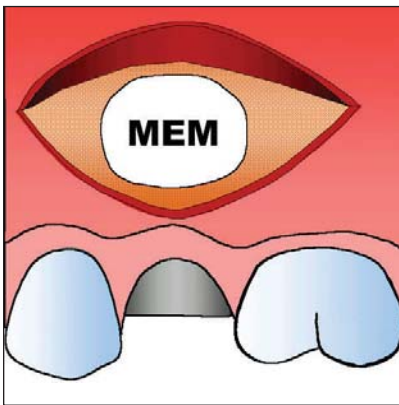
**Fig 1** After tooth extraction the socket is evaluated using an instrument or a small curette. If the bony defect is localized in the apical area and coronal bone is present, an apicoectomy semilunar incision design is utilized.



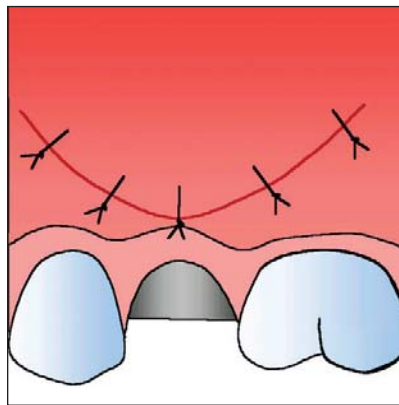
**Fig 2** The flap should provide access to the apical bony defect, leaving the coronal tissue intact.



**Fig 3** The implant is placed (IM) and a gingival prosthetic component is connected (P).



**Fig 4** (Left) Guided bone regeneration is utilized to correct the apical bony defect. The bone graft is covered with a membrane where necessary (MEM).



**Fig 5** (Right) The flap is sutured to provide primary closure.

was achieved using 3-0 silk sutures (Fig 8d). A radiograph was obtained to determine the position of the implant and the gingival prosthetic abutment (Fig 8e). The sutures were removed 1 week postoperatively, and healing was uneventful. Utilization of this technique allowed the preservation of the form of the gingiva and interdental papillae (Figs 9a to 9d).

This case shows that even with a minimal zone of remaining coronal bone or gingiva, the hard and soft tissue integrity can be maintained.

## DISCUSSION

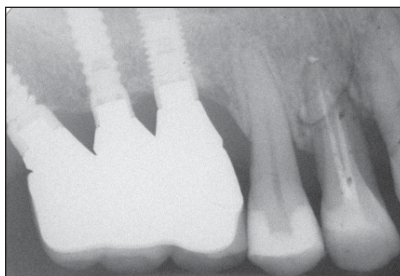
The conventional approach to implant placement in sites with periapical bone deficiencies, whether the deficiency is related to periapical pathosis, dehiscence of the extraction socket, or fenestration of the apical part of the implant osteotomy, requires that a full-thickness flap be raised for access to the area. Although such an approach may provide successful results with respect to new bone formation, the soft tissue healing remains much less desirable, and the

esthetic outcome usually is compromised by loss of papilla, tissue shrinkage, and uneven soft tissue margins. In the majority of cases additional soft tissue procedures are necessary to correct the outcome of the full-thickness flap access.<sup>30</sup> The authors have described a surgical technique that will provide access to the apical aspect of the defect for guided bone regeneration without compromising the integrity of the coronal gingival margin and papilla by avoiding incisions and flap reflection in this zone.

The apicoectomy flap design has been introduced and extensively used by endodontists to gain access to the apical aspect of the tooth root for surgical apicoectomy.<sup>33,34</sup> The flap design calls for a semilunar incision<sup>34</sup> that usually remains in the mucosa, although it may extend into the apical edge of the masticatory mucosa. Using this approach, access to the apex of the tooth is achieved while the coronal gingiva remains intact, and the esthetic outcome remains uncompromised. A similar incision design was used in the present study to address an extraction site and osteotomy preparation in a case of apical bony deficiency. The success of this surgical approach depends upon care-



**Fig 6a** Clinical view of the first right maxillary premolar.



**Fig 6b** Periapical radiograph of the first right maxillary premolar.

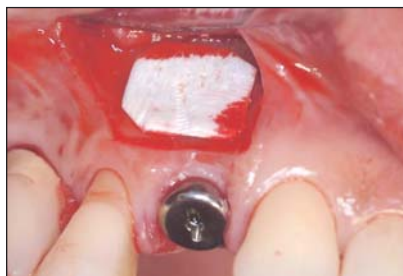
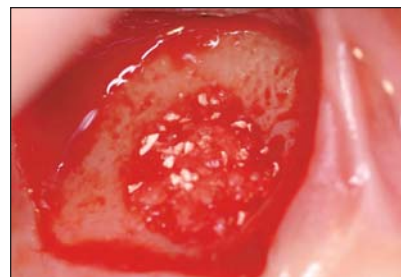


**Fig 7** A full-thickness flap was raised, leaving the coronal band of gingiva with the underlying bone intact.

**Fig 8a** (Left) The implant and healing cap in position.



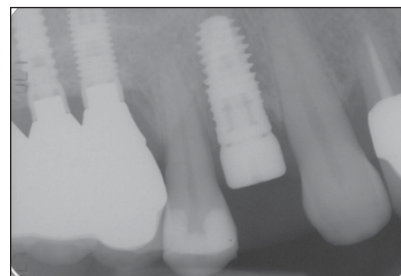
**Fig 8b** (Right) The apical defect with the bone graft. Note the remaining coronal hard and soft tissue.



**Fig 8c** Epi-Guide resorbable membrane placed over the bone graft.



**Fig 8d** Flap closure using 3-0 silk sutures.



**Fig 8e** Periapical radiograph of the implant immediately after placement at the maxillary right first premolar site.

**Fig 9a** (Left) Healing at the 3-month interval. Note the maintenance of the soft tissue integrity and healing of the apicoectomy flap incision.



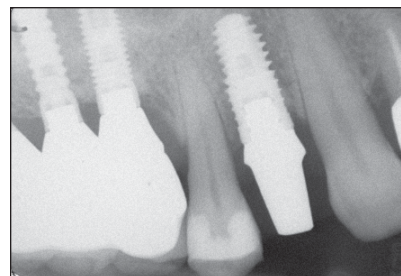
**Fig 9b** (Right) Healing after 7 months with the healing cap removed.



**Fig 9c** (Left) Healing at the 1-year interval with the definitive prosthesis in place.



**Fig 9d** (Right) Radiograph of the implant with the definitive restoration.



ful examination of the extraction site to confirm the presence of coronal bone, especially on the facial wall of the implant site. The design and extent of the incision are critical, since the incision must expose the entire apical defect for execution of the regenerative procedure. If a dehiscence is present and coronal bone is compromised or missing, then this procedure is contraindicated, and a full-thickness flap with guided bone regeneration is required.

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