

IMPLANT PLACEMENT WITHOUT FLAPS: A SINGLE-STAGE SURGICAL PROTOCOL — PART 1

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Osseointegrated implants have been demonstrated to be predictable, efficacious means of restoring aesthetics and long-term function to edentulous patients. Although the surgical and placement protocols for the use of implant therapy have continued to evolve, specific criteria must be addressed when utilizing this modality. The objective of this article is to describe the requisites for proper implant placement and demonstrate the use of a novel surgical protocol to insert implant fixtures in selected edentulous sites with a mucosal tissue punch rather than a conventional flap elevation procedure.

Controlled multicenter human studies have demonstrated that the treatment of edentulous patients with implants of variable systems provides successful long-term oral rehabilitation.¹⁻⁶ According to the traditional surgical protocols of most contemporary implant systems, the implant fixtures must be submerged during the initial healing phase.¹⁻⁶ Infection is thus minimized, apical proliferation of mucosal epithelium along the implant surface is prevented, and the risk of undue early loading of the implant is eliminated.

In previous reports on implant dentistry, however, Linkow and Chercheve stated that "It is unwise to eliminate communication between a buried implant and the oral cavity. It is also important to use an implant design

that encourages drainage from the onset of its insertion. The healing around the implant will then occur uneventfully."⁷ The histological studies of these investigators demonstrated no direct implant-bone contact and, contrary to current concepts, the presence of dense peri-implant connective tissue was considered advantageous.⁸

Using the ITI system (Straumann, Waltham, MA), Schroeder et al challenged concepts originating from the Bränemark protocol that stated implant submergence was mandatory until second-stage surgery in order for osseointegration to occur.⁹ These researchers successfully demonstrated proper anchorage of titanium implants to bone using a single-stage procedure. These findings were further supported by controlled studies that exhibited clinical and histological evidence that ITI dental implants can be properly osseointegrated and successfully utilized for the retention of fixed partial dentures; these implants can also be utilized when a single-stage implant surgery is performed.¹⁰

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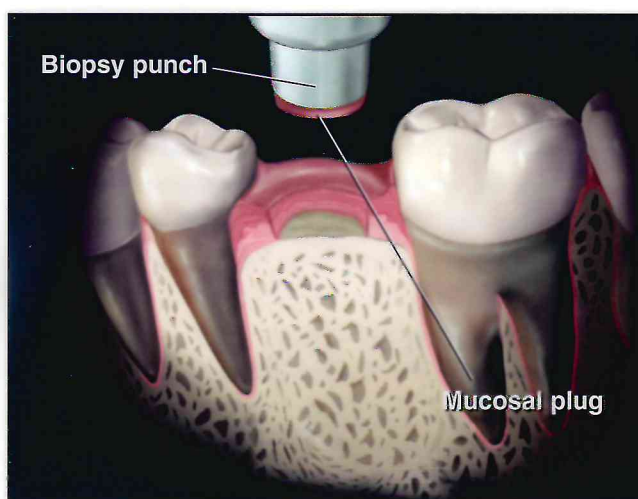


Figure 1. Illustration depicts the removal of a circular mucosal "plug" utilizing a biopsy punch.

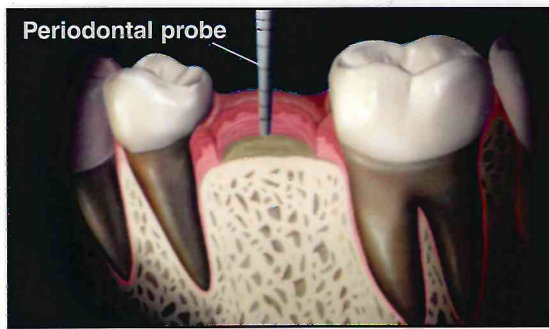


Figure 2. Using a periodontal probe, the depth of the mucosal lining is measured.



Figure 3. A depth gauge is employed to measure the total site depth (from the surface of the mucosal tissue to the bottom of the osteotomy).



Figure 4. Illustration demonstrates the placement of the implant fixture into the prepared site, which is covered with a healing abutment for 2 to 6 months.

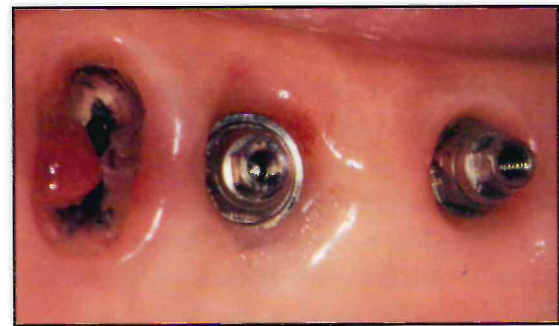


Figure 5. Case 1. Occlusal view following the removal of the fixed partial denture. The maxillary first premolar is severely decayed and fractured.

Recently, successful short-term results using the single-stage procedure have been reported with Brånemark implants,¹¹⁻¹⁴ and numerous studies have reported the immediate loading of implants to be a successful and predictable treatment modality.¹⁵⁻¹⁹ In either case, according to the surgical protocol of all contemporary implant systems, implant placement into the jawbone must be preceded by flap elevation and exposure of the implant site for improved access and visualization of the implant site and anatomical landmarks in the surgical field. Linkow and Charchev, however, did not exclude the possibility of obtaining access to the bone by "perforation of the [intact] fibromucosal tissue" lining of the ridge.⁷ Buchs had recently suggested the use of the "one-step punch approach" as a minor modification to this approach. This technique, as described, does not require flap elevation, but uses a tissue punch to remove a plug of gingival tissue to minimally expose the ridge prior to preparation of the osteotomy.²⁰ Avoiding flap elevation has previously been suggested in the implementation of socket seal surgery prior to or simultaneously with immediate implant placement.^{21,22}

This article demonstrates the clinical procedure for the soft tissue punch technique and presents its use in selected implant surgeries.

Clinical Procedure

Examination and Assessment of the Implant Site

When anatomic obstructions in the region of the implant site are evident (eg, high muscle attachments, bony ledges, limited mouth opening, or high floor of the mouth) and may impose difficulty in flap management, the use of the proposed technique might be indicated. The width and shape of the bony ridge are carefully examined by finger palpation, radiographs, and, occasionally, computed tomography scans and advanced imaging techniques. As an additional means of diagnosis, a sharp instrument may be utilized to perform sounding to bone once the patient has been anesthetized. Since direct vision of the bony ridge is impossible with the punch technique, only ridges with a minimum bone width of 7 mm may be considered adequate.



Figure 6. Radiographic view of metal-reinforced provisional prosthesis. The first premolar is cantilevered with no connection to the root.

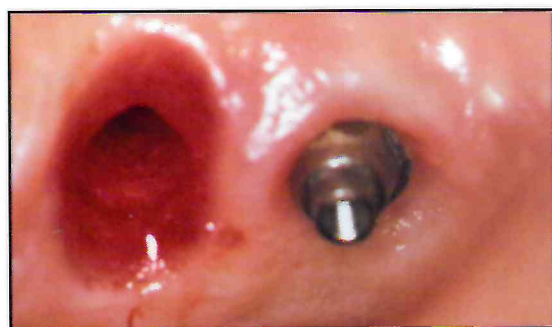


Figure 8. Magnified view of the osteotomy, performed without flap elevation, which might have jeopardized the integrity of the adjacent tissues.

Preparation of the Implant Site

Once the exact location of the implant site has been determined, a circular "plug" of the mucosal lining is removed with a biopsy punch. The diameter of the circular plug corresponds to the implant diameter (Figure 1) and establishes a soft tissue tunnel through which the drills may pass during preparation of the implant site. Advancing with the drills to the depth of the implant site, the ridge is held firmly between the clinician's fingers to allow directional control by palpation; intensive vibrations may indicate possible approximation of the drills to the outer surface of the bony cortical plates.

Implant Selection and Placement

Although the estimated implant length is planned prior to surgery, its final length is determined only following final site preparation. The definitive depth of the site in bone is calculated by subtracting the mucosal depth (Figure 2) from the total site depth (Figure 3).

Due to its increased surface area and rate of integration to bone in the initial healing phase, the use of a

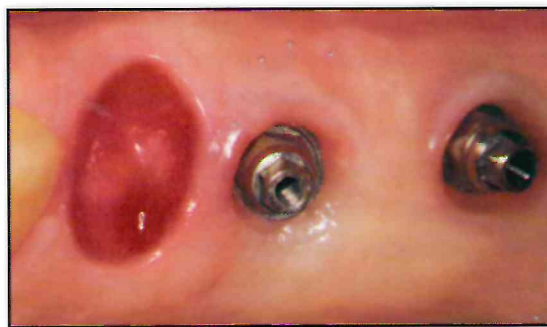


Figure 7. Occlusal view 6 months following root extraction and ridge preservation. Note the ovate-shaped configuration due to guidance of the pontic.

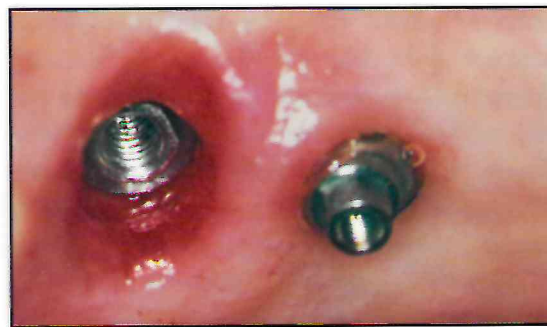


Figure 9. Magnified view of the implant fixture (Brånemark, Nobel Biocare, Westmont, IL) placed into the prepared extraction socket.

threaded implant with a treated surface is preferred.²³ If a nonthreaded (ie, press-fit) implant is utilized, care must be taken to ensure its utmost adaptation to the bony walls of the site for primary stabilization. The position of the implant head is dictated by the selected implant system and the preferred surgical protocol, and may be established at crest level or slightly supracrestally.

Abutment Selection and Connection

Immediately following implant placement, a healing abutment is connected (Figure 4). Due to its ability to prevent loosening, the use of a two-piece antirotational abutment is preferred by the authors. In order to allow efficient hygiene control, the abutment should protrude 2 mm to 3 mm from the ridge. Care must be taken to avoid occlusal contact with the opposing dentition.

Postoperative Instructions

The patient is generally administered 500 mg diflunisal tablets 3 times daily as necessary; no antibiotic regimen is prescribed. Patients should also be instructed to use

0.2% chlorhexidine-gluconate rinses for one minute 3 times daily and to avoid any physical disturbances of the implant site. Two weeks postoperatively, the initiation of gentle brushing and flossing is indicated. Four weeks following implant placement, regular plaque control may resume. The patient is examined on a weekly basis until 6 weeks postsurgery, and once per month thereafter until the prosthetic phase of the treatment is initiated.

Case Presentations

Case 1

A 48-year-old female patient presented with pain associated with a fixed implant and a fixed partial denture supported by the dentition on the left maxillary sextant. The mucosal tissue associated with the first premolar was sensitive to palpation; upon removal of the fixed partial denture, the tooth was determined to be fractured, severely decayed, and sensitive to percussion (Figure 5). A provisional metal-acrylic fixed partial denture was fabricated to connect the second molar to the preexisting implants and was cantilevered over the root of the first premolar tooth (Figure 6).

The root was removed and the extraction socket was treated to preserve adequate ridge dimensions. Six months postsurgery, the ridge exhibited sufficient width without the pronounced concavity on its vestibular aspect typically observed following tooth extraction in this region. A wide ovate-shaped concavity was noted at the site of the pontic (Figure 7). Since the ridge demonstrated adequate width and flap elevation might have risked tissue integrity in the neighboring implant and tooth (Figures 8 and 9), an



Figure 10. The transmucosal prosthetic abutment (Estheticion, Nobel Biocare, Westmont, IL) is immediately connected to the seated implant.



Figure 11. Occlusal view of the implant-supported restoration 5 years postconnection.



Figure 12. Radiographic view 2 years following the connection of the implant to the fixed partial denture.

implant fixture (Brånemark, Nobel Biocare, Westmont, IL) was inserted without using flaps. Since the preexisting implants had been functioning for 3 years, the decision was made to immediately load the newly inserted implant.

A prefabricated transmucosal abutment (Estheticion, Nobel Biocare, Westmont, IL) was screwed to the implant (Figure 10) and a porcelain-fused-to-gold restoration was manufactured and connected to the abutments. Five years following connection, the entire 3-unit prosthesis demonstrated satisfactory function (Figure 11). In addition, the postoperative radiographs exhibited a solid bone profile (Figures 12 and 13).

Case 2

A 65-year-old female patient presented with a failing fixed partial denture on the maxillary right sextant. Removal of the prosthesis revealed that the molar abutment teeth were severely decayed (Figure 14) and, when examined



Figure 13. Panoramic radiograph 5 years following connection. Note the solid bone profile associated with the implant at site #12.

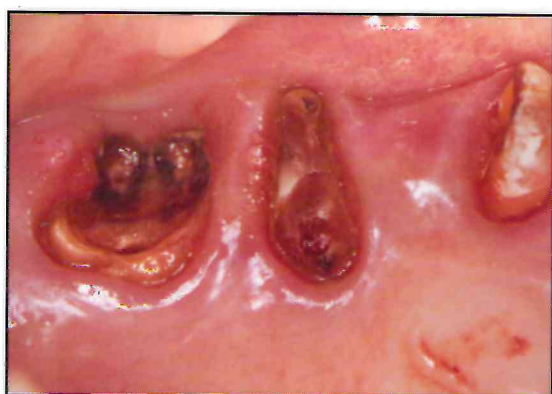


Figure 14. Case 2. Once the existing fixed partial denture was removed, the severe decay of the second molar and remaining roots of the first molar was evident.

radiographically, were determined to be poor candidates for a durable tooth-supported restoration. An implant-supported restoration was planned for this area, but since the patient opted not to wear a provisional removable partial denture, it was decided to retain the remaining roots of the first molar to support a transitional prosthesis until the implants had osseointegrated for occlusal loading. The second molar was extracted, and 6 months postoperatively, the ridge demonstrated sufficient width and the overlying mucosa had become fully keratinized.

Since the vestibulum became markedly narrow upon opening of the mouth due to extreme proximity of the coronoid process to the tuberosity, flap manipulation at this area was determined to be complex. Consequently, two implants were placed in the second molar region using the punch technique; an additional implant was placed in the site of the mesiobuccal root of the first molar using a traditional flap approach (Figures 15 and 16).

Five months following implant surgery, the implants were observed to be clinically osseointegrated and adequate for support of the prosthesis. The remaining roots of the first molar were removed, and a fixed partial denture was provisionally cemented to screwed prefabricated titanium abutments (DIA, Steri-Oss, Yorba Linda, CA). A composite resin (Artglass, Jelenko, Armonk, NY)-fused-to-gold was the system selected for the definitive restoration, whereas a traditional porcelain-fused-to-gold (Coptek, Precious Chemicals, Longwood, FL) crown restoration was permanently cemented on the natural first premolar abutment (Figures 17 and 18). The four-unit implant-supported fixed partial denture consisted of 3 retainers and a pontic; a narrow occlusal table was designed for optimal force distribution to the prosthetic system of the implants. Since this patient was treated 5 years ago, the materials and treatment concepts of the period were consequently utilized.

Discussion

Single-stage implant surgery was previously suggested by Linkow and Chercheve, who claimed successful long-term results but failed to histologically demonstrate direct bone-to-implant contact.^{7,8} This may be partially explained by the selection of implant designs and materials that differed from those currently used and by the implementation of a surgical protocol less rigid and precise than the protocol used for contemporary implant systems. Immediate loading as practiced by Linkow and Chercheve may also be considered a contributory factor for the failure of osseointegration.

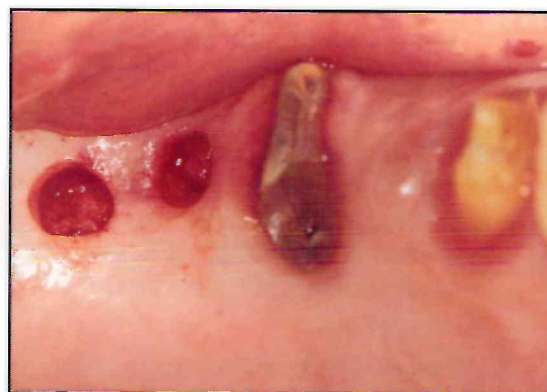


Figure 15. Six months postextraction, osteotomies were performed in the second molar area without using flaps due to an extremely narrow vestibule that compromised access to the site.

Clinical and histological findings from several recent clinical studies, however, demonstrate that proper anchorage of implants may be obtained when implants are exposed to the oral cavity or even loaded during the initial healing phase.⁹⁻¹⁹ These findings, as well as the clinical cases presented in this article, may contradict the assumption that osseointegration occurs only by using the two-stage implant surgical approach. Although the submergence of implants may not be required for osseointegration to occur, several factors are currently esteemed as mandatory for implant placement. Without question, the implant fixture should be biocompatible, surgical trauma should be minimized, and primary anchorage should be attained. In addition to these requisites, the clinician must acknowledge that immediate loading should be selectively implemented. Finally, infection must be prevented through the use of a rigid "sterile" surgical protocol and a meticulous postsurgical oral hygiene regimen.

Based on their experiences, the authors prefer the use of the one-step punch technique in the following clinical situations:

- When the bony ridge is relatively wide with no buccal or lingual concavities.
- In the presence of bony ledges, high muscle attachments and limited mouth opening that may result in difficult and complex flap elevation and manipulation.
- Where vital organs (eg, the mental nerve opening) are remote and their direct visualization is not required.
- When the patient cannot discontinue the use of anticoagulants and prolonged bleeding may occur during flap surgery.
- When primary anchorage and stabilization of the implant may be predictably obtained.
- When meticulous plaque control can be maintained.
- In the presence of a relatively broad zone of keratinized gingiva on the crest of the bony ridge since an indispensable amount of keratinized tissue is lost by removal of the mucosal plug.
- Where the integrity and topography of the neighboring soft and hard tissue should not be impaired (eg, when a neighboring tooth is involved in an ongoing guided tissue regenerative process).



Figure 16. Healing abutments were connected. Due to a buccal ridge concavity, the additional implant at the second premolar area was placed using a single-stage procedure with flap elevation.



Figure 17. Occlusal view of a 4-unit (restoring 2 molar teeth) cemented Artglass-fused-to-gold restoration 2 years postcementation. Note reduced occlusal tables for optimal force distribution to the prosthetic system.

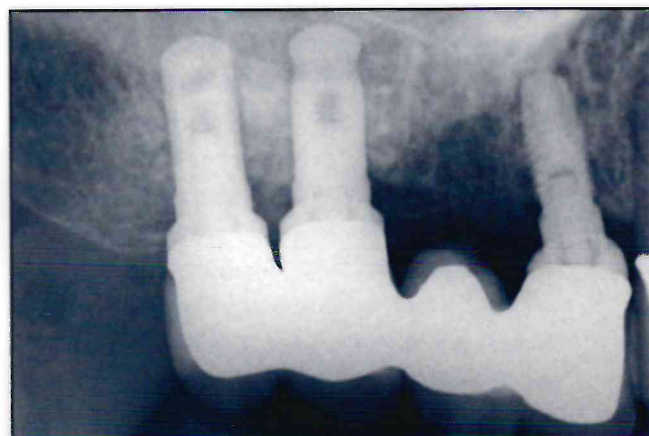


Figure 18. Radiographic view of the definitive Artglass-fused-to-gold restoration 5 years following implant placement.

Although it may appear a simple and minimally traumatizing procedure, the punch technique should be performed selectively by the skilled and experienced clinician, since it is essentially a "blind" procedure that limits the clinician's ability to directly evaluate the quality and dimensions of the ridge and other possible anatomical limitations. Furthermore, no sufficient clinical and histological data have been published to date to encourage the use of this procedure on a predictable basis.

Conclusion

Implant placement without flap elevation may be performed in different selected clinical situations as described. This approach minimizes surgical trauma to the patient and significantly reduces the time period from implant placement to implant loading. When the aesthetic appearance of the soft tissue surrounding the implant-supported restoration is of primary concern, however, the two-stage implant approach is often advantageous since soft tissue augmentation may be predictably achieved by flap manipulation around the healing abutment during implant exposure.^{24,30}

As previously discussed, the no-flap approach is essentially a "blind" surgical procedure that should be carefully performed by only a skilled and experienced clinician. In time, the evolution of progressive imaging technologies will most likely be able to provide the necessary data for a safer execution of this technique. At present, the authors advise that additional clinical and histological studies should be completed prior to the implementation of this approach on a routine and predictable basis.

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