

The Efficacy of Modular Transitional Implants Placed Simultaneously With Implant Fixtures

CE 3

Abstract: *After the placement of implants in areas in which several teeth have been lost, both the clinician and the patient face many difficulties, particularly during healing. If no prosthesis is provided, the patient's quality of life suffers. If a removable prosthesis is provided for optimum mastication and speech, many complicated adjustments of the denture may become necessary during healing, and the possibility of osseointegration failure increases. This case report describes simultaneous placement of implant fixtures and modular transitional implants, providing occlusal function immediately after placement. The use of modular transitional implants is very effective in maintaining good oral function for the patient.*

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Under normal physiological conditions, implants made of commercially pure titanium or titanium alloys form and maintain an oxide layer without apparent breakdown or corrosion.¹ Osseointegrated implants have been clinically successful, with marginal bone loss of 0.05 mm to 0.1 mm after 1 year.^{2,3} However, complications have been reported with implant placement. For example, minor movements to which the implant is subjected soon after placement interfere with the osseointegration process, causing fibrosis around the implant.⁴⁻⁷ These movements also accelerate resorption of the crestal bone surrounding the implant.⁸

The healing process of bone requires careful placement of implants. But because an optimal environment for implant placement does not always exist, dentists should consider appropriate supplemental procedures to promote successful osseointegration. This article describes simultaneous placement of a modular transitional implant and an osseointegrated implant in the posterior region of the edentulous mandible.

Case Report

A healthy, 59-year-old woman experiencing difficulty eating and speaking sought a bilateral fixed prosthesis in her partially edentulous mandible (Figure 1). Each of her remaining teeth—Nos. 10, 11, 18, 22, 23, 24, 25, and 31—was affected by cervical caries, and the mandibular left canine was completely decayed. The maxillary anterior was traumatized by occlusal interference from the mandibular teeth.

Initial treatment included extraction of the patient's hopeless canine and correction of the occlusal planes of her removable partial dentures. Radiographs (Figure 2) and computed tomography scans (Figure 3) did not suggest any contraindication to implant placement and various laboratory values were within the normal range.

Eight ITI[®] dental implant fixtures^a were placed, four on each side of the mandible (Figure 4). To prevent interference from a variety of forces and to facilitate cleansability, the fixtures were semi-submerged under the gingiva. At the same time, two modular transitional implants^b were placed in the lingual side of the interproximal region of the fixtures in the middle of the edentulous space on each side.

^a Straumann USA, Waltham, MA 02154

^b Dentatus USA, Ltd, New York, NY 10016

Learning Objectives:

After reading this article, the reader should be able to:

- describe the simultaneous placement of implant fixtures and modular transitional implants.
- discuss the factors that contribute to the success of implant osseointegration.
- describe the clinical and biological results of implant treatment of broad edentulous spaces.



Figure 1—Oral view of the mandible at the first visit. Edentulous areas are seen on both sides.



Figure 2—Pantomograph for the first visit. The fully decayed mandibular left canine was extracted later.

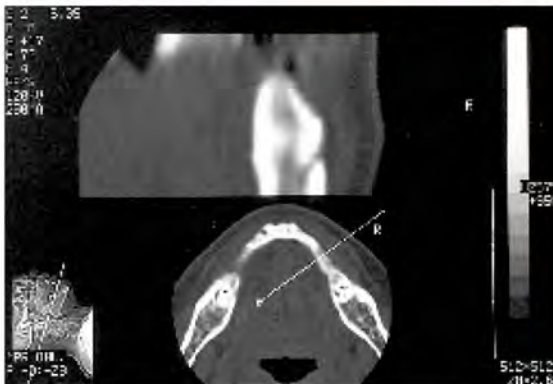


Figure 3—This computed tomography scan shows the precise location and direction of the mandibular canal.



Figure 4—Transitional implants are placed in the lingual side, between the main implant fixtures.



Figure 5—Main implants are semi-submerged and fully covered by mucosa, and a transgingival modular transitional implant is seen in the lingual side of the middle of the edentulous area.



Figure 6—Postoperative pantomograph. Eight semi-submerged implants and two transitional implants are seen in the edentulous area of the mandible.

side of the interproximal region of the fixtures in the middle of the edentulous space on each side (Figures 4 through 6). The implanted site corresponded to the lingual cortical plate of the mandible. Components of the Dentatus Modular Prosthetic System (MP)^b were used for the provisional restorations, and the transitional implants were connected to the remaining natural teeth (Figures 7 and 8).

Some implant fixtures gradually became exposed several weeks after placement, possibly as a consequence of the rupture of the oral

mucous membrane. An antibiotic paste applied to the site of exposure and an antiseptic oral rinse were prescribed, and oral hygiene instruction was repeated. Four months after placement, the submerged fixtures were exposed, and the modular transitional implants were removed (Figure 9).

While the soft tissue healed, provisional restorations were placed on the implant fixtures. Six months after surgery, the residual teeth were restored and the final superstructures were placed (Figures 10 through 13).



Figure 7—MP components are attached to the transitional implants.



Figure 8—Provisional restoration using the MP system in combination with the residual teeth and modular transitional implants during the integration of the main implants.



Figure 9—Just after removal of the modular transitional implants, 4½ months postoperatively. A tiny hole can be seen in the interproximal area between the dental implant fixtures.



Figure 10—Pantomograph, 14 months after the implant placement.



Figure 11—Occlusal view of the final superstructure.



Figure 12—Lateral view, 14 months after implant placement.

Discussion

Factors that affect the success of osseointegration of implants include:

- oral hygiene of the patient;
- anatomical form of the operation site;
- form of superstructure; and
- selection of the most appropriate time for each step of the procedure.^{2-4,9}

Clinical and biological difficulties arise for implant treatment of broad edentulous spaces. When removable partial dentures are used as provisional prostheses to maintain oral func-

tion, frequent adjustment, including rebasing, may be required.^{10,11} Patients may not readily accept these uncomfortable, frequently adjusted and relined temporary restorations.¹² In addition, the harmful micromotion may be transmitted to the implant in the early stages of osseointegration.

Immediate or early stage loading of the implant during osseointegration limits bone growth and maturation.⁴⁻⁷ To provide sufficient time to establish bone integration, loading of the implant should be delayed. Because these



Figure 13—Lateral view, 14 months after implant placement.

factors influence the results of implantation, modular transitional implants appear to be an effective means for achieving osseointegration of implant fixtures.

The combination of modular transitional implants and implant fixtures can maintain mastication and speech and be esthetically acceptable to the patient during the healing of osseous tissue.^{13,14} The combination is applicable not only to the two-stage surgical procedure, but also to the one-stage system. In this case, the eight implant fixtures were semi-submerged for oral hygiene and the facilitation of maintenance, which are designated and advocated by the implant manufacturer as the one-stage operative concept.^{15,16}

The combination of modular transitional implants and implant fixtures can maintain mastication and speech and be

Furthermore, this combination procedure saves time for the oral surgeon and the restorative dentist because it requires only minor changes to the previously worn removable prosthesis. No modifications are required during healing or during any stage of fabrication of the final prosthesis. To ensure ready acceptance by the patient, the form of the temporary restoration is mimicked in the final partial.

The modular transitional implants are easily removed by simply unscrewing them when the final abutments are seated with the provisional bridge.¹³ This causes only a minor injury

to the implant site and produces no patient discomfort.

Conclusions

If removable prostheses are not provided over wide edentulous areas during osseointegration, no patient can escape diminished esthetics and function. The modular transitional implant/implant fixture combination offers significant advantages to the patient and is a useful management technique for the dentist before implant fixtures are loaded.

References

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Quiz 3

This article provides 1 hour of CE credit from Dental Learning Systems, Co., Inc., in association with the University of Southern California School of Dentistry and the University of Pennsylvania School of Dental Medicine. Record your answers on the enclosed answer sheet or submit them on a separate sheet of paper.

1. **Osseointegrated implants can cause how much bone loss after 1 year?**
 - a. 0.05 mm to 0.1 mm
 - b. 0.03 mm to 0.1 mm
 - c. 0.1 mm to 0.2 mm
 - d. 0.1 mm to 0.5 mm
2. **Until the final prosthesis is finished:**
 - a. no provisional restoration is needed.
 - b. prepare a removable partial denture.
 - c. prepare a fixed prosthesis based on residual teeth and transitional implants.
 - d. prepare a fixed prosthesis based only on the residual teeth.
3. **Micromovement of an implant can:**
 - a. interfere with osseointegration, causing fibrosis around the implant.
 - b. enhance osseointegration.
 - c. decelerate resorption of the crestal bone surrounding the implant.
 - d. eliminate the need for frequent adjustments
4. **Successful osseointegration of implants depends on:**
 - a. oral hygiene of the patient.
 - b. anatomical form of the operation site and superstructure.
 - c. selecting the most appropriate time for each step of the procedure.
 - d. all of the above
5. **When removable partial dentures are used as provisional prostheses:**
 - a. patients find them very comfortable.
 - b. they require frequent adjustment.
 - c. they never require rebasing.
 - d. they never transmit micro-movements.
6. **The simultaneous placement of a modular transitional implant and implant fixtures is applicable to:**
 - a. the one-stage surgical concept.
 - b. the two-stage surgical concept.
 - c. both the one-stage and the two-stage surgical concept.
 - d. neither the one-stage nor the two-stage surgical concept.
7. **When the submerged fixture has been exposed, prescribe:**
 - a. an antiseptic oral rinse.
 - b. the application of antibiotic paste.
 - c. oral hygiene instruction.
 - d. all of the above
8. **The purpose of the modular transitional implant/implant fixture procedure is to:**
 - a. gain a good esthetic result during healing of the main implant.
 - b. provide sufficient time to establish osseointegration.
 - c. maintain masticatory and speech function during healing.
 - d. all of the above
9. **Modular transitional implants are removed:**
 - a. through a complicated procedure.
 - b. by unscrewing them from the jawbone.
 - c. in the early stages of osseointegration.
 - d. when they become exposed.
10. **If removable prostheses are not provided over wide edentulous areas during osseointegration:**
 - a. the patient will experience only diminished esthetics.
 - b. the patient will experience only diminished mastication and speech.
 - c. the patient will experience diminished function and esthetics.
 - d. the patient will experience diminished mastication, but speech will not be affected.

Please see tester form between pages 72 and 73.