Immediate Loading of an Implant Following Implant Site Development Using Forced Eruption: A Case Report

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In restoring periodontally involved hopeless teeth, implant treatment has been widely used with combinations of various grafting techniques or guided bone regeneration. Instead of traditional surgical procedures, forced tooth eruption may be used successfully for implant site development. In this case, the authors orthodontically erupted a hopeless central incisor with an angular bony defect. Subsequently, they placed an implant immediately after tooth extraction and immediately loaded it with a temporary resin restoration. Int J Oral Maxillofac Implants 2005;20:621–626

Key words: *dental implants, forced tooth eruption, immediate loading*

Since the report of Adell and associates,[1] well-documented studies on consecutive series of implant treatments have shown endosseous dental implants to be a viable option for the restoration of missing teeth. Subsequently, dental implants have become widely accepted by most clinicians worldwide.[2] In cases of severe alveolar bone resorption, additional treatments such as bone grafts,[3–5] guided bone regeneration,[6–8] ridge splitting,[9] and distraction osteogenesis[10] have been performed serially or simultaneously to prepare the implant site. Generally, not only has the success rate been relatively low in cases where there is severe resorption, but the treatment time also tends to be lengthened, regardless of the method or methods of bone augmentation used.[3–10]

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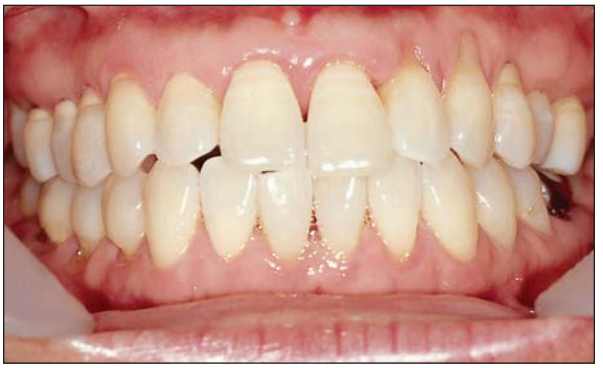
The protocol proposed by Adell and associates[1] recommended the use of a stress-free healing period of 3 to 6 months with a 2-stage procedure, but as surgical techniques have become more sophisticated, many clinicians have reported the early or immediate loading of implants.[11–13] (Recently, reducing treatment time and improving esthetics have received the attention of patients and practitioners.) Traditionally, forced eruption has been performed for clinical crown lengthening procedures, but Mantzikos and Shamus[14,15] introduced this procedure for implant site bone development. The following patient study is presented to illustrate the advantages of forced eruption in the rehabilitation of patients with bone defects.

CASE REPORT

The patient was an otherwise healthy 41-year-old female who was a nun. She had previously received restorative treatment for the cervical abrasion of several maxillary teeth, but no teeth had been extracted. The chief complaint was that her incisors had slowly lengthened over time. Radiographic examination as well as periodontal probing and visual inspection revealed that her maxillary left central incisor had periodontally sustained severe alveolar bone loss, with resultant horizontal and vertical mobility (Fig 1). The



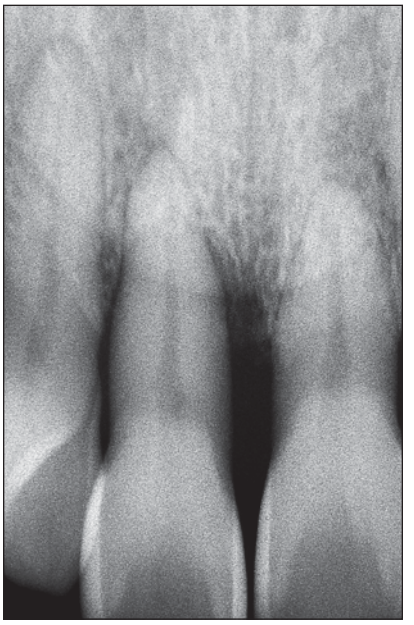
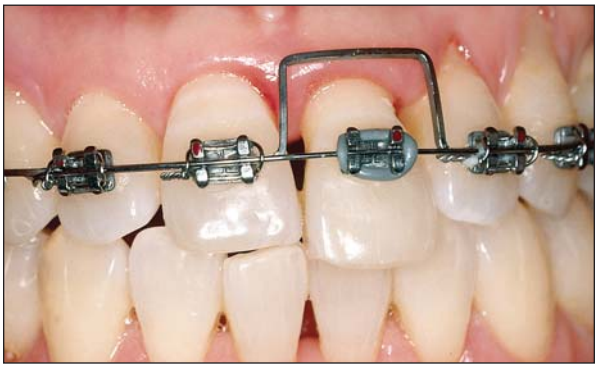


Fig 1 Initial examination. *(Above)* The elongation of the maxillary left central incisor was seen. *(Right)* An angular bony defect was seen on the radiograph.



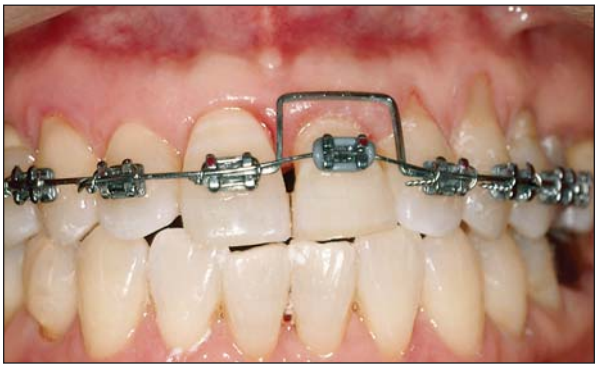


Fig 2 Forced eruption by NiTi overlay wire. *(Left)* The tooth after 2 weeks of forced eruption. The incisor was erupted by 0.14 NiTi overlay wire. The 0.19 × 0.25 rectangular bypass main wire fixed the other teeth to prevent unwanted movement. *(Right)* At the same time, occlusal reduction was done to avoid premature contact, and the bracket was rebonded cervically to activate the NiTi wire.

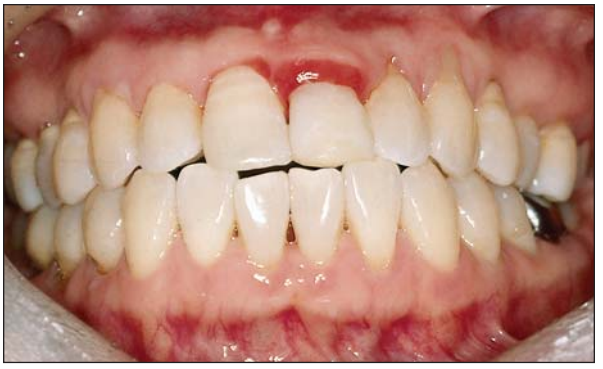


Fig 3 After 6 weeks, the characteristic red patch around the tooth was seen. The red patch was thought to be sulcus gingiva turned inside out.

maxillary left central incisor was diagnosed as being a hopeless tooth. However, the authors decided to maintain all the other teeth through periodontal management. The restorative treatment plan for the extracted left central incisor was single implant therapy.

Before extracting the tooth, consideration was given to the size of the resultant defect. Therefore, implant site bone development using forced eruption was planned rather than a bone graft or guided bone regeneration. Following thorough scaling and root planing, forced eruption was done using a fixed appliance incorporating an overlay nickel and titanium (NiTi) wire (Fig 2). The .022 slot brackets were passively bonded to the maxillary dentition, and leveling and aligning was done subsequently using .016 and .018 NiTi wire. After the short leveling procedure, the main arch wire (.019 × .025 stainless steel) was placed, which was designed to bypass the left central incisor as shown in Fig 2. The .014 NiTi segmental wire was overlaid and ligated as an acting component, forcing the central incisor to move in an incisal direction. Follow-up and reactivation of the fixed appliance had be

Fig 4 *Retention period and evaluation of the results of the forced eruption.*

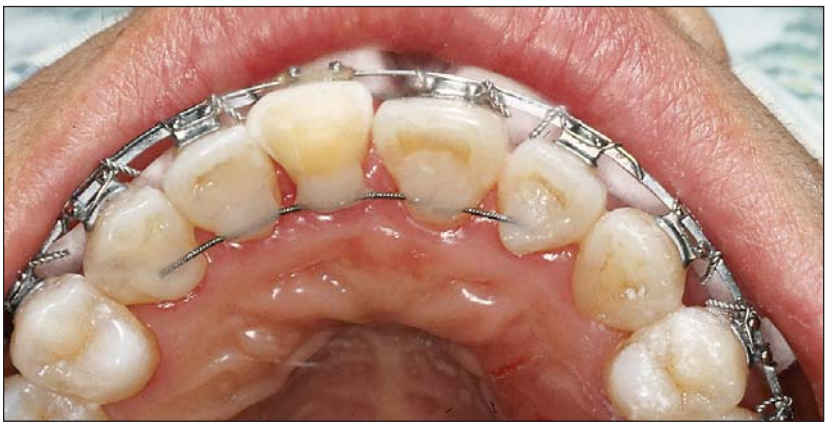


Fig 4a The lingual fixed retainer was bonded before the labial fixed appliances were debonded.

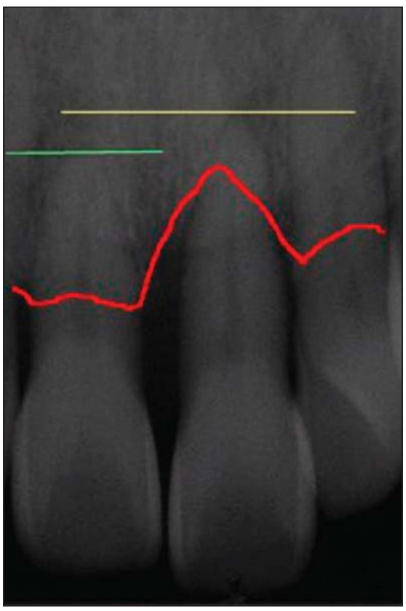


Fig 4b *(Left)* The initial radiograph. The red line indicates the bone level; the yellow line indicates the apex level of the left central incisor; the green line is the apex level of the right central incisor.

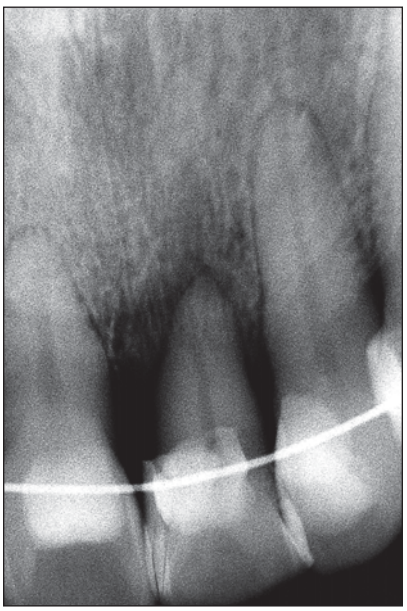


Fig 4c *(Right)* A radiograph obtained after forced eruption. The new bone level shows the result of forced eruption.

done within 2 weeks. During the forced eruption procedure, the incisor edge was selectively ground to prevent premature contact. The characteristic red patch around the cervical gingival margin developed (Fig 3). After the active forced eruption, a retention period of 6 weeks was imposed to await bone growth in the extraction socket (Fig 4). During this period, a lingual fixed bonding retainer was used.

At the end of the retention period, an impression was made for surgical guide fabrication and preparation of a temporary resin prosthesis. The temporary prosthesis was highly polished at the cervical and left crude at the incisal. The diagnostic waxup was performed and utilized in the fabrication of the temporary resin prosthesis. Using a commercially available titanium temporary sleeve, the autopolymerizing acrylic resin was added as the ideal form and emergent profile at the cervical. The authors planned to complete the incisal portion at chairside using light-curing composite resin to prevent any soft tissue irritation at the surgical site by resin monomer.

On the day of the first surgery, incisions were made and the bone fill confirmed. An implant 4.0 mm in diameter and 13 mm in length was placed with almost no gap between implant and bone. Placement was performed using an Osseocare implant engine (Nobel Biocare, Göteborg, Sweden), and the final insertion torque was more than 30 Ncm (Fig 5). Therefore, the decision was made to load the implant immediately, and the temporary resin crown was completed with light curing composite resin on the prepared temporary sleeve after appropriate suturing (Fig 6). After 7 days, the sutures were removed, and the temporary crown was refined for gingival esthetics.

One month later, the definitive restoration was fabricated using a customized UCLA abutment and ceramometal crown. Using a commercially available

Fig 5 *First surgery.*

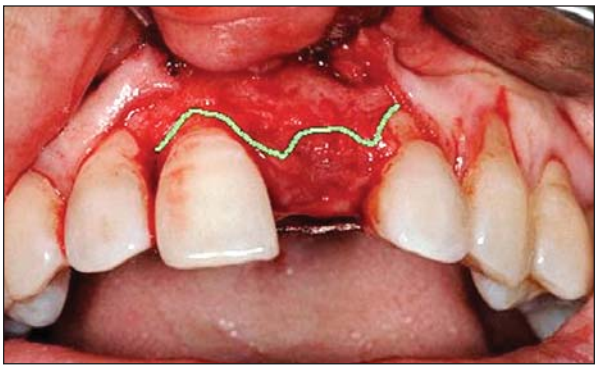


Fig 5a After an incision was made, the bone fill was confirmed.

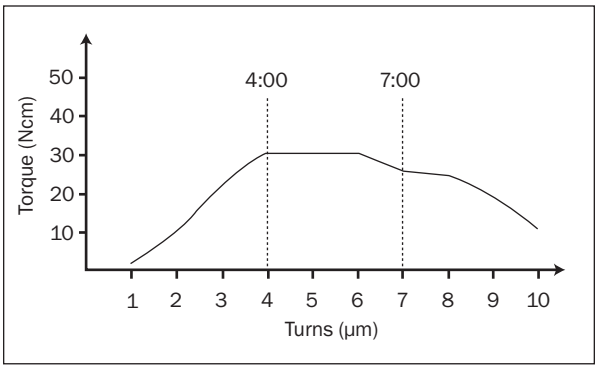


Fig 5b The graph shows the final insertion torque measurements. From 4 to 7 turns, the torque value was more than 30 Ncm.

Fig 6 *Immediate placement of temporary crown.*

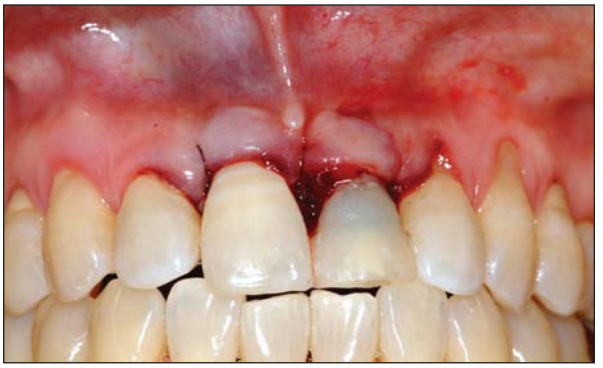
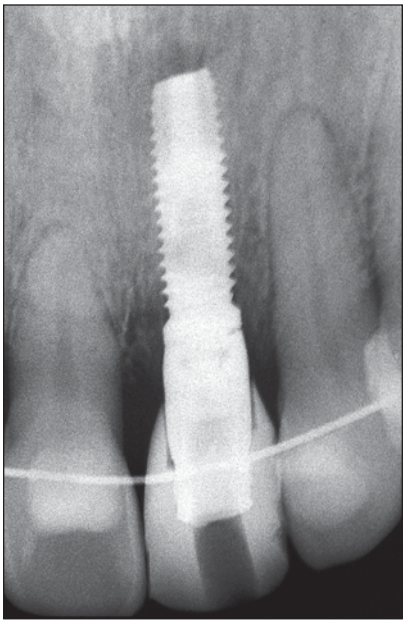


Fig 6a *(Above)* After suturing, the prepared temporary resin restoration was placed, and the incisal portion was completed by adding light-curing resin to prevent soft tissue irritation caused by resin monomer at the surgical site.

Fig 6b *(RIght)* Radiograph after placement of the temporary prosthesis.



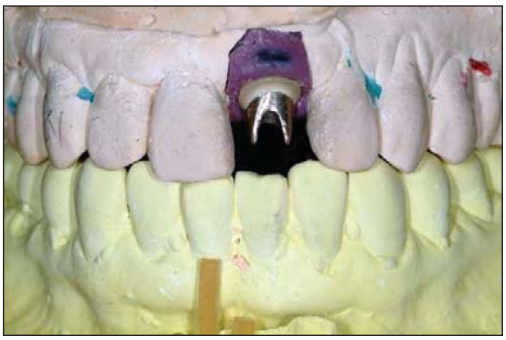
UCLA combination sleeve, the customized abutment was fabricated as the definitive ceramometal crown with a porcelain margin. This abutment design has 2 advantages: Reshaping is possible after stabilization of the marginal gingiva, and a gold hue through the marginal gingiva can be avoided. The patient was pleased with her treatment time and results (Fig 7).

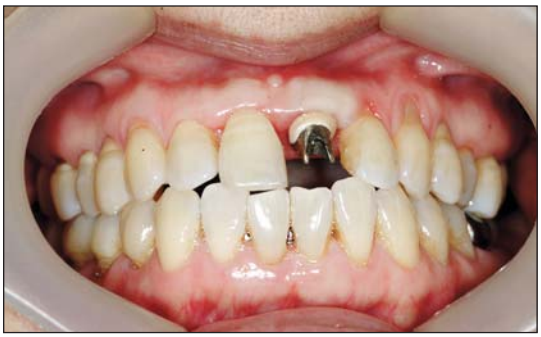
The patient was recalled 6 months, 1 year, and 2 years later. The implant showed no signs of failure (Fig 8); the authors will continue to recall the patient annually.

CONCLUSION

This case report described the treatment procedure for a patient with an alveolar bone defect at the maxillary left central incisor. The procedure used was orthodontic treatment—forced eruption and immediate loading. This treatment modality had several advantages over a conventional approach with bone grafting: less treatment time, no need for expensive bone graft material, reduced need for additional surgical procedures, better results regarding soft tissue regeneration, and no risk of flap deficiency.

Fig 7 *Customized esthetic abutment fabrication and final result.*





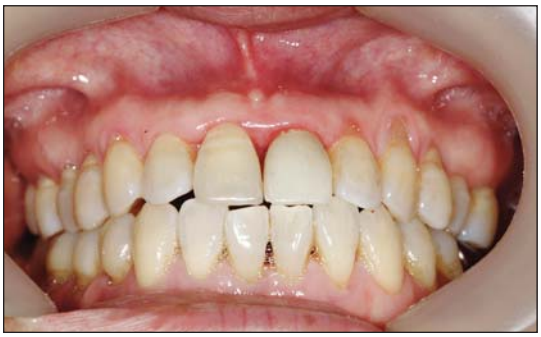
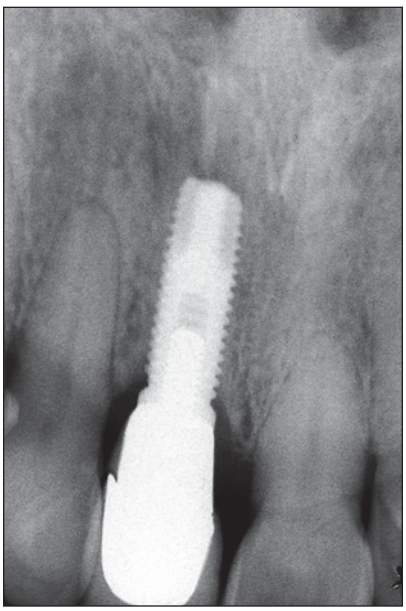


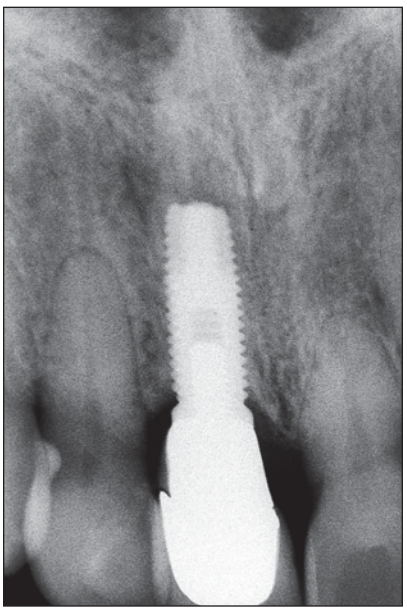
Fig 7a *(Above)* Using commercially available UCLA combination sleeve, a customized abutment was fabricated as the definitive ceramometal crown with a porcelain margin. This form of abutment has 2 advantages: It can be prepared after stabilization of marginal gingiva, and a gold hue through the marginal gingiva can be avoided.

Fig 7b *(Top right)* Intraoral photograph after the abutment was placed.

Fig 7c *(Right)* After definitive restoration was delivered to the patient.

Fig 8 Follow-up radiographs *(left)* at the 1-year follow-up examination and *(right)* at the 2-year follow-up examination.





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