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Long-term stability of implant site-switching technique and early orthodontic loading: A 16-year case report

KEYWORDS
Orthodontic loading;
Implant site-switching;
Stage IV periodontitis

Orthodontic implant site-switching techniques (OISST) have been utilized to close and augment a reduced edentulous ridge, thereby creating a more favorable site for implant placement.[1] However, the optimal timing for loading implants placed in orthodontically regenerated bone, particularly for use as orthodontic anchorage, remains unclear.[2] Furthermore, long-term reports on the outcomes of OISST combined with early orthodontic loading in patients with Stage IV periodontitis are rare. The purpose of this 16-year case report was to evaluate the long-term stability of dental implants following OISST and early orthodontic loading.

A 36-year-old male patient with Stage IV periodontitis was referred to the Periodontal Department at Taipei Tzu Chi Hospital, New Taipei City, Taiwan. The study protocol was approved by the Ethics Committee of the institutional review board (13-IRB032). He complained of tooth missing and mesial tilting of lower left second molar (Fig. 1A). The ridge defect of tooth 36 was noted. Tooth 38 with severe periodontitis was extracted. Active orthodontic treatment with self-ligating orthodontic braces (Damon Q; Ormco, Orange, CA, USA) was performed every 4–8 weeks. After 11 M active orthodontic therapy, tooth 35 was moved into the reduced edentulous ridge of tooth 36, creating a better implant site (Fig. 1B). A flapless implant placement was performed at the site of tooth 35. A provisional restoration was delivered two weeks after implant placement. The dental implant was also used as orthodontic anchorage approximately two months post-placement. Clinical and radiographic outcomes after a 16-year follow-up were showed in Fig. 1C. A marginal tissue recession of 3 mm and minimal marginal bone loss were observed for both tooth 35 implant site and tooth 36 site. The width of the alveolar process, decreased by 9 % in the newly established edentulous and implant sites. Conversely, in the areas where the tooth had moved, the width increased by 38 %. Cone-beam computed tomography (KaVo, 3D eXam, Biberach, Germany) was performed at the final examination, and the stability of the marginal bone level at tooth 35 implant site and of tooth 36 site was validated (Fig. 1D).

This case report demonstrates that periodontal and peri-implant health, as well as ridge dimensions, can be maintained for 16 years following OISST and early orthodontic loading. Martin et al. reported that orthodontic tooth movement has no significant impact on periodontal outcomes in patients with treated periodontitis.[3] Orthodontic tooth movement into a reduced edentulous ridge carries the risk of recession defects.[4] Excessive movement speed may increase the risk of bone dehiscence and marginal tissue recession.

A prosthetic implant was used for orthodontic anchorage in this report. In a prospective controlled study, Palagi et al. evaluated the success of prosthetic implants subjected to immediate occlusal and orthodontic forces over a follow-up period of at least two years.[2] The results demonstrated immediate orthodontic forces did not compromise the success of dental implants.

In this report, a 3 mm gingival recession was observed at the tooth 35 implant site and the tooth 36 site after 16

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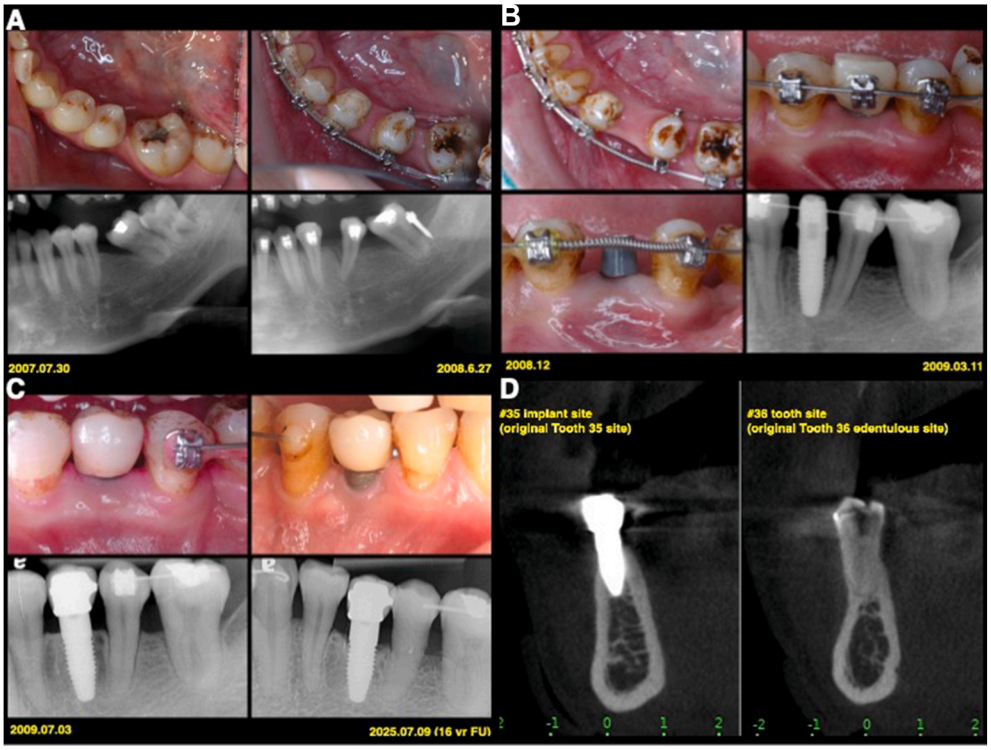

Figure 1 Clinical photographs and radiographs of the patient.
(A) A 36-year-old male patient presented with a missing tooth and mesial tilting of the lower left second molar. A ridge defect was noted at tooth 36. The pretreatment panoramic radiograph showed mesial tilting of tooth 37 and severe periodontitis affecting tooth 38. Tooth 38 was extracted. A mini-screw was placed distal to tooth 37 to facilitate the distalization of tooth 35 and the uprighting of tooth 37. After 11 months of active orthodontic treatment, tooth 35 was moved toward tooth 36, resulting in an improved implant site. (B) Orthodontic treatment successfully moved tooth 35 into the reduced edentulous ridge of tooth 36, thereby enhancing the implant site. A flapless implant placement was performed at the site of tooth 35. A provisional restoration was delivered two weeks after implant placement. The dental implant was also used as orthodontic anchorage approximately two months post-placement. (C) Clinical and radiographic outcomes after a 16-year follow-up. (D) Cone-beam computed tomography performed during the final examination confirmed the stability of the marginal bone level and ridge dimensions.

years of follow-up, which may have been influenced by bone remodeling and trauma from tooth brushing. Cairo et al. reported that peri-implant mucosal recession is also a common finding five years after lateral guided bone regeneration, and that the use of soft tissue grafts significantly predicts greater stability of the peri-implant mucosal margin.[5] In carefully selected cases, the OISST may reduce or even eliminate the need for advanced surgical procedures, while also significantly minimizing ridge resorption. However, in patients with a thin tissue phenotype, such as in the present case, both soft and hard tissue augmentation are recommended to promote long-term tissue stability.

Within the limitations of this 16-year case report, the OISST may serve as an alternative approach for implant site development and ridge augmentation. Additionally, a prosthetic implant was successfully utilized as orthodontic anchorage in a patient with Stage IV periodontitis. However, further prospective, controlled studies with larger sample sizes are necessary to validate these findings.

Declaration of competing interest

The authors have no conflict of interest to declare.

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