Flapless implant surgery: a 2-year follow-up study of 40 implants

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Objectives. Flapless implant surgery is fast gaining popularity because of several advantages, such as reduced surgical time, postoperative bleeding, and swelling. Studies have shown that flap elevation results in some amount of bone loss. The aim of the current study was to compare the amount of bone loss in procedures using the flapless technique and those where flap elevation was done. Papillary fill was also compared in both techniques, which is unique to this study.
Study Design. Forty patients, selected according to certain inclusion and exclusion criteria, were randomly assigned to 1 of 2 groups: Flap (F), or Flapless (FL). The amount of crestal bone loss was measured from standardized radiographs at baseline, 6 months, 1 year, and 2 years after implant placement. Papillary fill was evaluated using the Papillary presence index, which was measured 6 months after loading.
Results. The bone loss was greater for the F group during all time periods and the mean papillary fill was greater for the FL group.
Conclusions. In conclusion, the results of the current study show that flapless implant surgery results in less crestal bone loss both during the healing period and after loading. In addition, it can produce better papillary fill. The cases selected for this study were ideal cases in terms of bone volume and the operator was well experienced, however. Care should be taken during case selection for flapless implant surgery. (Oral Surg Oral Med Oral Pathol Oral Radiol 2013;116:e237-e243)

Management of edentulous spaces has been revolutionized by dental implants. Dental implant therapy has replaced most of the conventional methods of treating edentulous patients and has become a highly predictable treatment modality. Albrektsson et al.[1] in 1986 proposed certain criteria to assess success of implants. According to these criteria, bone loss of less than 0.2 mm annually following the implant's first year of function is stated as being essential for long-term success. Since then, the crestal bone area has been considered as a significant indicator of implant health. With the rapid advancement of dental implant therapeutics, the current trend is now geared toward enhancing esthetics and patient comfort. Establishing intact papillae and gingival contour around implants is of utmost importance, especially in patients who display soft tissue during function, such as speaking and smiling.[2,3] Salama et al.[4] have established that the interproximal height of bone is an important factor in achieving optimal esthetic outcomes.

Implant placement can be done by either elevating a flap or using a flapless approach. Flapless implant surgery has been gaining popularity among implant surgeons. It has been suggested as a treatment modality for the preservation of soft tissue and for increasing patient comfort and satisfaction.[5-9] Studies have demonstrated that flap reflection often results in bone resorption around natural teeth.[10,11] Postsurgical tissue loss from flap reflection has been reported in the literature.[12] Research thus indicates that elevating flaps for implant placement may lead to less than ideal esthetic outcomes, especially in the anterior maxilla. Flapless implant surgery has been shown to have several advantages, such as preservation of circulation, soft tissue architecture, and hard tissue volume at the site; decreased surgical time; improved patient comfort; and accelerated recuperation, allowing the patient to resume normal oral hygiene procedures immediately after the procedure. However, the procedure also has some drawbacks, which include the surgeon's inability to visualize anatomic landmarks and vital structures, the potential for thermal damage secondary to reduced access for external irrigation during osteotomy preparation, the increased risk of malposed angle or depth of implant placement, a decreased ability to contour osseous topography when needed to facilitate restorative procedures and to optimize soft tissue contours, and, most important, the inability to manipulate soft tissues to ensure circumferential adaptation of adequate dimensions of keratinized gingival tissues around emerging implant structures.[13]

For single-tooth implant restorations, predictable interdental papillae rely on the adjacent natural teeth having adequate interproximal bone.[14-17] Although there have been several reports regarding the clinical outcome of flapless implant surgery on single-tooth implants, limited data are available for the evaluation of soft tissue

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Table I. Inclusion and exclusion criteria

Inclusion criteria	*Exclusion criteria*
Patients requiring single-tooth replacement in the anterior and premolar region	Patients with complicating medical history, such as uncontrolled diabetes, bleeding disorders, osteoporosis; patients on radiation therapy; and immunocompromised states
Patients who had completed their final growth	Untreated periodontitis
Patients with adequate bone without the need for grafting	Smokers
	Patients with bruxism

profile. The purpose of this study was to evaluate interproximal crestal bone height and the presence or absence of interdental papilla around single-tooth implants placed using flap and flapless surgery.

MATERIAL AND METHODS

Patient selection and study design

Forty patients requiring single-tooth replacement in the maxillary anterior and first premolar region were included in the study. The patients were selected from the patient pool of a private clinical practice. The patients were selected using certain inclusion and exclusion criteria (Table I). All cases selected were ideal in terms of quantity of bone and soft tissue biotype. Information obtained from the patients included complete medical and dental history and smoking habits; clinical and radiographic evaluation was done. After case selection based on inclusion and exclusion criteria, patients were assigned randomly to 1 of 2 groups—flap (F) (20 patients) or flapless (FL) (20 patients) using the coin toss method (Figure 1). Hence, randomization was done only for patient allotment to the study groups. The patients were aged between 25 and 62 years. Twenty-five of the patients were men and 15 were women. The study period starting from patient enrollment to data collection was from July 2006 to April 2009. Informed consent was obtained from all patients. There was no loss of patients to follow-up. The study was a double-blind study. Patients were selected by one investigator and the surgical procedures were performed by another. The guidelines of the Helsinki Declaration were adhered to in the current study.

Presurgical procedure

Selection of patients was followed by full-mouth scaling, root planing, and oral hygiene instructions.

Surgical procedure

The surgical field was prepared and isolated and the area was anesthetized using 2% xylocaine hydrochloride with epinephrine (1:200,000). At the implant recipient site of the F group, a midcrestal incision was made and a sulcular incision was made on the mesial aspects of the adjacent teeth with a Bard-Parker blade No. 15, and a full-thickness flap was elevated. Initial entry was gained with a no. 5 round bur. The pilot drill was then used to the required depth. A digital IOPA (intraoral periapical radiograph) was taken to verify the length and angulation of the prepared osteotomy with the pilot drill in place. The osteotomy preparation was then completed using drills of incremental sizes. The site was then prepared to the required diameter to receive the appropriate implant. The implants were then placed into the osteotomy site and the flaps were approximated and sutured using interrupted sutures (4/0 Mersilk, Ethicon, UK). For the FL group, there was no flap elevation. A no. 5 round bur was used to make an initial entry through the soft tissues and the bone. The site preparation was completed similar to the F group and the implants were placed. Suturing was not required for this group (Figure 2). The implants used were root-form endosseous implants that made use of an internal hex abutment connection system. The implants used varied in diameter from 3.7 to 4.8 mm and in length from 13 to 16 mm.

Postsurgical procedure

Digital IOPA's were taken postoperatively. The patients received amoxicillin 500 mg 3 times daily for 5 days and ibuprofen 400 mg twice a day for 3 days. Patients were recalled after 7 days for suture removal. Recall appointments were made at 3 and 6 months.

Clinical parameters

The parameters evaluated were interproximal height of bone and papillary index.

- Interproximal height of bone (IHB) was defined as the measured distance (in millimeters) between the apical end of the first thread of the implant to the most coronal point of the interproximal crestal bone (Figure 3). Radiographs were used to determine the IHB. This parameter was recorded from radiographs. It was recorded at baseline and 6 months, 1 year, and 2 years after implant placement. The paralleling cone technique was used to standardize the radiographs. All radiographs taken were digital radiographs. The Schick CDR 4.0 software (Schick Technologies, Long Island City, NY) was used to make all the measurements on the radiographs. Measurements were made using a line tool. This software yields an accuracy of 0.1 mm. The IHB was measured for each implant interproximal area at baseline, 6 months, 1 year, and 2 years and the difference in the bone height was calculated for each time period for the F sites and the FL sites. This was then statistically analyzed.