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Original Research

Advantage of Flapless Implant Surgery in the Healing of Peri-Implant Tissue

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***ABSTRACT*:**
Introduction: The introduction of dental implants has revolutionized our ability as oral health care practitioners to manage and restore partially and completely edentulous states. Flapless surgery for implant placement has been gaining popularity among implant surgeons. it has numerous advantages, including preservation of circulation, decreased surgical time; improved patient comfort; and accelerated recuperation. This study was carried out to evaluate the efficacy of the flapless technique of implant placement. **Methodology:** As a part of the study to evaluate crestal bone loss changes after placement of implant using the flapless technique, we placed forty endosseous implants. Access was achieved to the crestal bone using tissue punch. Clinical and radiographic analyses were performed second and fourth month after placement of implant. **Results:** All implants survived with no signs of peri-implantitis. The findings of the present study demonstrate that the average crestal bone loss around the implant at 4 months using flapless technique was 0.16mm. No implants failed to osseointegration, and no implants exhibited bone loss greater than 0.5mm in first four months. This present study shows significantly less postoperative pain in the flapless technique of implant placement. **Conclusion:** Over all conclusions drawn from this study is that predictable success can be achieved when implants are placed using flapless approach. Better hard and soft tissue integration can also be achieved. This procedure when used decreased over all treatment time with reduced patient's appointments. The flapless approach is a predictable procedure when patient selection and surgical technique are appropriate.
Key words: Dental implants, flapless approach.

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INTRODUCTION

Dentition forms the integral part of the stomatognathic system. The primary function of teeth is to prepare food for swallowing as well as to initiate and facilitate digestion. Teeth are also necessary for the articulation of speech and proper aesthetics. The abnormality in anatomy of tooth generates a compromised repaired structure both in function and form.[1] A balance of force provides an anatomically steady-state when teeth are present. With loss of even one tooth element, however steady-state is broken and a variety of progressive changes takes place. Loss of tooth/teeth results in impairment of integrity of dental arch leading to loss of structural balance, inefficient oral function and poor esthetics.[2, 3]

The latest modality of treatment of partial and completely edentulous patients is dental implants. The introduction of dental implants has revolutionized our ability as oral health care practitioners to manage and restore partially and completely edentulous states. Implant prosthesis offers a more predictable treatment outcome than traditional restoration. Dental implant therapy has been used more frequently for the rehabilitation of missing dentition than by conventional restorations. Implant dentistry also offers a more predictable and long lasting fixed outcome as compared to traditional restorations[4].

The introduction of osseointegration in 1977 by Branemark et al. revolutionized oral rehabilitation in partially and fully edentulous patients1. This concept was based on the utilization of a mucoperiosteal flap which was designed for the visualization of underlying bone by reflecting the alveolar crest soft tissue for placement and closure with suture on

completion of the procedure.[5] This concept implies that implants should be covered by soft tissue to warrant primary stabilization and decrease infection as a standard of care. For many practitioners, the flap technique has remained the mainstay of implant surgery as it allows better visualization, particularly in areas of inadequate bone quantity. Despite their popularity, flap techniques have disadvantages including gingival recession, bone resorption around natural teeth, soft tissue deficiency from flap raising and negative implant aesthetic outcomes.[6]

Flapless surgery for implant placement has been gaining popularity among implant surgeons. it has numerous advantages, including 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.[7] Flapless approach does have some drawbacks. Some of these include the surgeon's inability to visualize anatomic landmarks and vital structures, the potential for thermal damage secondary to reduced access for external irrigation and, most importantly, the surgeon's inability to manipulate soft tissues to ensure circumferential adaptation of adequate dimensions of keratinized gingival tissues around emerging implant structures.[8] The present study was conducted to assess the crestal bone loss after the flapless technique of implant placement in patients.

MATERIAL & METHODS

This is a prospective controlled clinical study conducted on patients. A total of forty patients with missing mandibular posteriors requiring implant rehabilitation were included in this study. The implant sites were radiographically evaluated for a span of four months.

For evaluation following criteria were considered:

- The postoperative pain after the flapless technique of implant placement.
- The early crestal bone loss after the flapless technique of implant placement.

SELECTION CRITERIA

Ethical clearance was obtained by the ethical committee before the commencement of the study. The patients were selected on the basis of certain preset inclusion and exclusion criteria.

Inclusion criteria: Sufficient bone width and height, Absence of excess tissue undercut, Patients age: 18-50 years, Patients who are cooperative, motivated and hygiene conscious are included, Site: Mandibular posteriors.

Exclusion criteria: Patients who are not willing to enroll in the study, Patients with uncontrolled systemic diseases, Patients with atrophied ridges (inadequate ridge width or height), Chronic smokers (fibrosis due to smoking), Patients with thick gingival biotype.

Alpha Dent Implants with active surface were used. These are two piece implants made of commercially pure titanium. The length of implant range from 8 to 13mm with a diameter ranging from 3.5 to 5mm.Tissue biopsy punches with a diameter ranging from 3.5 to 5mm: Used to access the alveoloar bone through the mucosa. Surgical twisted drills: Surgical twist drills of various diameters ranging from 2.0mm to 4.2mm were used in sequence to prepare the site. Depth gauge/paralleling pins: these gauges were used to obtain parallel preparation and to guide the direction of drilling procedure. They were also used to measure the depth of the surgical preparation for implant placement. ATR (Advanced Technology Research) Physio-dispenser and Reduction hand piece with internal irrigation: Used for implant osteotomy. Standard Diagnostic Tools: Bowls, Tongue depressors, Cheek retractors, Minnesota retractors, mouth mirror and probe, Tweezers, Bite blocks.

Patients reporting to our department of oral and maxillofacial surgery with complaints of missing mandibular posteriors requiring rehabilitation with implants were included for the study. To avoid infections all surgical procedure were performed under strict aseptic conditions and following standard protocols with greater attention paid towards preservation of implant bed. The dental unit, instrument tray, operating assistants was covered with sterile drapes. Sterile gowns, face masks, surgical gloves and instruments were indispensable. The surgical armamentarium including the tool kit was autoclaved. The written and informed consent was taken from the patient before the procedure to participate in the study and to attend regular follow-up. Preparation for surgery was made according to standard protocols.

Size of the used tissue punch varied accordingly to the width of the alveolar ridge ranging from 3.5mm to 5mm. Before beginning the implant osteotomy it was made sure that enough width of punch was used to access the sufficient width of alveolar bone for performing the implant procedure. The punch used was oriented such that the future implant placed remains parallel to the adjacent tooth. After sufficient ridge was exposed with the punch, bone drilling was performed at the revolutionary rate of 500-1200rpm under profuse irrigation with saline solution, to avoid overheating and necrosis of the alveolar bone and sharp twisted drills were used with increasing diameter prospective with the planned implant size. The endosteal implants were introduced into the prepared site and evaluated for the primary stability. It was made sure that the implant is completely into the prepared site and within suffices of the alveolar bone.

The site was left uncovered without suturing and patients were advised to apply. Metronidazole intraoral ointment over the implant site and use chlohexidine (0.12%) mouth rinse twice daily for further two weeks. The patients were followed up for assessment of study criteria.

RESULTS

The present study was done to assess the crestal bone loss and postoperative pain after the flapless technique of implant placement in patients. There were forty patients included in the study. There were 28 males and 12 females in the study. The average age of the patients included in the study was about 34 years.

The crestal bone analysis was done on the mesial and distal side at the end of 2nd month. The mesial side bone loss was found to be 0.09 ± 0.56 mm in males and 0.19 ± 0.30 mm in females. The distal side bone loss was found to be 0.14 ± 0.45 mm in males and 0.3 ± 0.10 mm in females. The crestal bone analysis was done on the mesial and distal side at the end of 4th month. The mesial side bone loss was found to be 0.20 ± 0.82 mm in males and 0.25 ± 0.01 mm in females, the distal side bone loss was found to be 0.21 ± 0.03 mm in males and 0.31 ± 0.04 mm in females. Paired t test was used for the statistical analysis. The statistical analysis shows that the gender difference shows that bone loss on mesial side was found to be significant in males and females.

Table 1: Gender-wise distribution of Crestal bone loss after 2ndmonths.

	2nd month mesial	**P value**
Male	0.09 ± 0.56	**0.03**
Female	0.19 ± 0.30	
	2nd month distal	
Male	0.14 ± 0.45	**0.07**
Female	0.3 ± 0.10	

Table 2: Gender-wise distribution of Crestal bone loss after 4th months.

	2nd month mesial	**P value**
Male	0.20 ± 0.82	**0.03**
Female	0.25 ± 0.01	
	2nd month distal	
Male	0.21 ± 0.03	**0.07**
Female	0.31 ± 0.04	

DISCUSSION

Endosseous dental implants have become a dependable and predictable method of replacing missing teeth to greatly enhance patient's quality of life. This has been achieved through developments and convergence in implant design and refinements of techniques. Implantologists are striving to further improve the entire patient journey through implant treatment – minimizing the peri- and post surgical discomfort, maximizing aesthetics and improving the long term success of the implants. Flapless implant surgery appears to be one way in which this can be aided.[9, 10]In periodontal tissues, angiogenesis seems to be important for both the maintenance of tissue health and chronic inflammatory periodontal disease. When teeth are present, blood is supplied to the bone from 3 different paths: the periodontal ligament, the connective tissue above the periosteum, and from within the bone. When a tooth is lost, there is no blood supply from the periodontal ligament, and blood is supplied only from the periosteal and intraosseous supply.[11] Cortical bone is poorly vascularized in contrast to marrow bone. When soft tissue flaps are reflected for implant placement, the supraperiosteal blood supply is also removed, leaving only poorly vascularized cortical bone without a part of its vascular supply, ultimately prompting bone resorption during the initial healing phase. Thus, the traditional flap technique of implant placement demonstrates more bone loss. The preservation of bone vascularization when no flaps are reflected may help optimize bone regeneration around implants.[12, 13]

This is supported by another study done by Jung-In Kim et al.[14] in 2009, showed that when implants were placed without flap elevation, the vessel number was about 51.4 and the vessel fraction was about 1.7%; this indicated that the peri-implant mucosa was more richly vascularized in the flapless group than in the flap group.[14] The more richly vascularized peri-implant mucosa is directly related to an increased blood supply around the implant, which may strengthen the resistance to inflammation. This also may explain the greater number of periimplantitis cases noted in the flap group than in the flapless group, as confirmed by bleeding upon gentle probing. This study suggests that the periimplant mucosa may have an improved defense system when implants are placed using the flapless procedure.

Flapless procedures result in: a. Less post operative bleeding, b. Less discomfort for the patient, c. Shorter surgical treatment times, d. Reduced healing times, e. Healing without or with minor swelling. In the flapless surgical technique, a round tissue punch is used to remove the soft tissue on the crestal bone at the implant site. Clinical preconditions for a flapless approach include a minimum of 5.0mm of keratinized tissue, because the flapless procedure requires the actual removal of some tissue; at least 4-5mm of bone width must be available without undercuts.[15]

The crestal bone area is considered a significant indicator of implant health. Crestal bone is the area that bears the maximum stress around an implant. Blood supply to the crestal bone area is reduced around an implant compared with that of a natural tooth, because the blood vessels from the periodontal ligament are absent. Its major source of blood supply is from the periosteum covering the bone.[16] The results of this study indicate that the placement of implants by the flapless technique of implant placement result in minimal crestal bone loss.

The findings of the present study demonstrate that the average crestal bone loss around the implant at 4 months using flapless technique was 0.19mm. No implants failed to osseointegrate, and no implants exhibited bone loss greater than 0.5mm in first four months. These low frequencies of both implant failures and progressive bone loss agree with findings from earlier studies, which found that flapless implant

surgery is a predictable procedure with a high success rate. This present study shows significantly less postoperative pain in the flapless technique of implant placement. In this present study our study population complained of moderate pain at 4th hour and 55% of patients reported with mild pain at 8th hour, with all our study subjects experiencing mild pain at 24th hour. This may be attributed to avoidance of reflection of a full thickness mucoperiosteal flap.

In our study, we used a soft tissue punch to gain access to the site of osteotomy. A punch size slightly narrower than the implant to be placed was used. The concern regarding this method is the presumption that some amount of epithelial tissue could be carried into the osteotomy site, affecting osseointegration. However, an animal study by Becker et al. showed no epithelial or connective tissue residues within the histologic sections in implant sites placed with the flapless technique.

The patients also benefits from the decreased number of appointments as there was so closure done with sutures which may needed removal, thus reducing the number of appointments to the patients. Soft tissue handling was done minimally thus excellent soft tissue integration was achieved.

The result of their study suggests that mini flap or flapless procedure is sufficiently safe and flap elevation can be avoided. Interesting finding in their study was that in the flapless group, no implants failed to osseointegrate (early failure); meanwhile 5 implants in the flap group failed to integrate during the healing process. This low frequency of both early failures and progressive bone loss in the mini-flap group agrees with findings from previous studies showing that flapless implant surgical procedure is a predictable procedure with a high success rate. One explanation for this observation may be that when no flaps are reflected, the preservation of the periosteum may help to optimize the healing of the peri implant tissue. Small, clean, and closed wounds heal more quickly with little scar formation, whereas large open wounds heal slowly and with significant scarring. Scar tissue differs from regular skin or mucosa in terms of vascularization. This principle can be applied to wounds around the implants. The surrounding mucosa after the flapless procedure had smaller, cleaner, and more closed wounds than that after the flap procedure, which may increase the amount of vascular structures in the peri-implant mucosa after the flapless procedure. Another explanation for the increase in vascular structures after flapless procedures may be the preservation of connective tissue vascularization when no flaps are reflected.

Various studies conducted for evaluation of success of implants placed using flapless approach shows promising results. In a study done by Seung-MiJeong et al in 2008 showed 100% success rate in the flapless group compared to 96.5% in flap group. The present study shows that implants placed using flapless approach preserves the peri implant tissues and there vascularity thereby reducing the post operative bone loss hence increasing the success rate of implants. This technique also reduces the number of patients' appointments and also considerably decreases the operating time. Additionally patients also experienced minimal post operative pain and discomfort following the flapless procedure. Proper patient evaluation and case selection is essential for achieving proper surgical and prosthetic outcomes.

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