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# Comparativeclinical Evaluation of Changes in Marginal Bone Level Following Implants Placed With Flapless Versus Flap Method

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**ABSTRACT**: Implant-supported restorations have been used as a successful modality in edentulous region restorations. The conventional technique for implant placement includes elevation of mucoperiosteal flap. Flapless technique is gaining popularity due to numerous advantages like preservation of circulation, soft tissue architecture, and hard tissue volume; improved patient comfort; and accelerated recuperation. Therefore, the study is aimed to comparethe marginal bone loss by both proceduresand evaluate which procedure leads to minimal crestal boneloss.The study concluded that flapless technique showed minimal crestal bone loss than flap technique which was statistically insignificant.

**KEYWORDS:**Flapless technique; Conventional flap technique, marginal / crestal bone loss.

## I. INTRODUCTION

[1] Dental implant-supported restorations are being used as a successful method of replacing missing teeth. Implant supported restorations in partly edentulous jaws has a high degree of success rate. A long-term success for using dental implants to replace edentulous region have been proved by several clinical trials. The survival rates of endosseous implants are as high as 85– 90% for implant-supported fixed prosthesis and > 90% for implants replacing single edentulous region and for implant supported prosthesis.

[1] The traditional approach involves full thickness mucoperiosteal flap reflection for better visualization of the recipient site. Alternatively, flapless surgery using a tissue punch device to gain access, each procedure having its own merits and demerits.

The Osseo integrated implant treatment modality was introduced in the 1960s, phenomenal studies have been conducted to come up with a safe and more rapid and a superior treatment option for the patients.

Flapless surgery, technique of dental implant placement is reaching out among surgeons and the patients due to innumerable advantages like preservation of circulation and soft tissue architecture, and hard tissue volume; decreased surgical time; improved patient support; and faster recovery, permits to resume normal oral hygiene procedures immediately.[2] Recently, flapless implant surgery has outlined to have a predictable outcome with a high success rate, as long as patients are properly selected for the procedure with an appropriate width of bone available for implant placement. The popularity of this technique can also be attributed to advances in radiologic technologies and dental implant treatment planning software, as clinicians can now acquire 3-dimensional images of potential implant sites before surgery.

[3] Minimally invasive flapless technique has the prospective to reduce crestal bone loss, soft tissue inflammation, and probing depth adjacent to implants.

[4] The underlying bone receives a limited protection following the removal of epithelial covering by the periosteum. Various studies have shown very mild reaction to split-flap techniques when the flap that covers the epithelium was replaced over the area of surgery. The striking feature that was noted was resorption continued even after the superficial regeneration of the gingival tissues and which lasted for minimum 4 weeks postoperatively. This resorption was observed along with severe inflammation which

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resembled the resorption pattern that occurred following denudation. Severe inflammatory reaction with bone resorption is noted when the periosteum on the alveolar process is exposed without adequate flap coverage. The amount of bone resorption that occurs with periosteal retention is nearly same as the resorption which occurs with denudation.

[5] The alleged reasons for choosing the flapless technique are to reduce the chances of postoperative loss of peri-implant tissue. Regarding the marginal bone loss, it can be anticipated that the flap surgery can cause higher marginal bone loss due to decreased supraperiosteal vascular supply.

[5] Other proposed merits of the flapless implant technique include minimal invasive surgery, reduced duration of the surgery, postsurgical healing is faster, lesser postoperative complications and increased patient recuperation.The risk of bone fenestrations or perforations can be reduced during implant placement, with flap elevation when a limited amount of bone is available.

[5,6] The demerits of this technique include masking of the true topography of the underlying bone available, as the mucogingival tissues are not raised it cannot be observed, which may increase the chances for undesired perforations that could lead to esthetical problems or implant losses. Certain surgical risks and complications maybe anticipated as it involves a concealed approach, which includes unknown bony dehiscence/fenestration and inappropriate implant position. Besides, there is reduced access for irrigation during osteotomy preparation most likely for thermal damage.

Changes in the crestal bone level can be influenced by various factors such as the surgical trauma, design of implant, and loading protocol. The influence of flap design on the level of crestal bone have been compared by several authors in various studies. Healthy soft tissue around a dental implant is very essential for its health, function, and aesthetics. The clinical importance of the has been identified as a dominant factor to. The biological or soft tissue seal around the implant, considered as a dominant factor which determines the long-term success of peri-implant health

The bone level changes and loss of Osseointegration are the prime radiographic findings that have been considered to implant failure. Therefore, this study is to evaluate the marginal bone changes on mesial and distal surfaces around dental implants after flapless and conventional flap implant surgery.

## II. METHODOLOGY

The study was conducted in the department of Oral and Maxillofacial Surgery of The Oxford Dental College and Hospital for a period of 2 years after ethical clearance. In the present study, edentulous areas are divided into 2 groups. Group 1 is area which receives implant by flapless technique and Group 2 is area which receives implant by flap technique. Total sample size for this study was 20.

**INCLUSION CRITERIA:**

- Age group between 18-60 years in both genders
- One or more edentulous space with adequate ridge dimension for implant placement
- Optimal bone quality and quantity of the edentulous space
- Absence of any periapical pathology adjacent to edentulous site

**EXCLUSION CRITERIA:**

- Patients with systemic disease and medications that may interfere with treatment outcome.
- Presence of active periodontal disease
- Pregnant and lactating women.
- chronic smokers and former smokers.
- Patients with Para functional habits.
- History of chemotherapy or radiation therapy.

## III. PROCEDURE

Based on the inclusion and exclusion criteria patients aged between 18 and 60 and with missing teeth were selected for implant placement to participate in this prospective controlled clinical trial. Patients were thoroughly evaluated for eligibility, i.e., to evaluate the bone availability and presence of any pathology through IOPA, OPG and CBCT.

After taking the detailed case history, patients were informed about every treatment options. Once the implant treatment was found to be feasible, the procedures, advantages, precautions, maintenance and care were explained and the patient's informed consent wasobtained.

A total of twenty implants were placed, 10 using flapless and 10 using with-flap techniques in a random manner. Two-stage, two-piece root form implants were placed which was standardized in length and width.

During the day of surgery patients were advised to take 2g of amoxicillin 1 hour prior to the surgery. A proper sterilization protocol wasfollowed.

Then the surgical field was prepared and

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disinfected by asking patient to gargle with Betadine mouth wash and extra oral surroundings were also cleansed with Betadine. The areas were anesthetized using 2% lidocaine hydrochloride with epinephrine (1:80,000).

In the flapless technique group A, the flap was not reflected, instead a tissue punch was used to give a cut on the soft tissues for the placement of implants through the soft tissues and the bone. Then pilot drill was used to gauge the required depth. The osteotomy preparation was completed using drills of incremental sizes. The site was prepared to the essential diameter to receive the suitable implant. After that the implants were placed into the osteotomy site and cover screw was placed. Suturing was not required for this category.

In the flap technique group B, at the implant recipient site of the Flap side, a mid-crestal incision was given, followed by, crevicular and vertical releasing incisions with a Bard-Parker blade No. 15, and a full-thickness flap was elevated. Then pilot drill was used to gauge the required depth. The osteotomy preparation was completed using drills of incremental sizes. The site was prepared to the essential diameter

to receive the suitable implant. Followed by placing the implants into the osteotomy site and cover screw was placed. Then flaps were approximated and sutured using interruptedsutures.

After which CBCT of the jaw was taken, covering implants placed with flap and flapless technique to record the immediate marginal bonelevels.

Patients were advised to continue routine oral hygiene procedures and were recalled after 1 week for review. After the implant placement, a series of CBCT was obtained immediately after implant placement, 3rd month, and 6th month. Then bone loss was measured in the mesial and distal aspects as seen in the CBCT by measuring the distance between the implant platform and the crestal bone that comes in contact with the implant fixture and the measurements were obtained.

## IV. RESULTS

TABLE 1

Comparison of Mean Marginal Bone Height (in mm) between 2 groups on Mesial side at different time intervals

| Time | Groups | N | Mean | SD | Mean Diff | P-Value |
|---|---|---|---|---|---|---|
| Pre-op | Group A | 10 | 15.19 | 6.63 | 0.16 | 0.97 |
| | Group B | 10 | 15.03 | 3.85 | | |
| Immediate Post-op | Group A | 10 | 14.98 | 6.52 | 0.11 | 1.00 |
| | Group B | 10 | 14.87 | 3.81 | | |
| 3 Months | Group A | 10 | 14.89 | 6.52 | 0.22 | 0.94 |
| | Group B | 10 | 14.67 | 3.84 | | |
| 6 Months | Group A | 10 | 14.82 | 6.49 | 0.21 | 0.97 |
| | | | | | | |
| | Group B | 10 | 14.61 | 3.83 | | |

From Table 1, it can be observed that the mean marginal bone height on mesial aspect of flapless site (Group A) was 15.19+/-6.63mm,14.98+/-6.52mm,14.89+/-6.52mm,14.82+/-6.49mm during pre-op, immediate post-op, at 3rd month post-op and at 6th month post-operatively. And in the flap site (Group B) was 15.03+/-3.85mm,14.87+/-3.81mm,14.67+/-3.84mm,14.61+/-3.83mm during pre-op, immediate post-op, at 3rd month post-op and at 6th month post-operatively. It was statistically insignificant

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TABLE 2

| Comparison of Mean Marginal Bone Height (in mm) between 2 groups on Distal side at different time intervals | | | | | | |
|---|---|---|---|---|---|---|
| Time | Groups | N | Mean | SD | Mean Diff | P-Value |
| Pre-op | Group A | 10 | 14.94 | 5.60 | 0.53 | 0.97 |
| | Group B | 10 | 14.41 | 4.00 | | |
| Immediate Post-op | Group A | 10 | 14.79 | 5.61 | 0.50 | 0.94 |
| | Group B | 10 | 14.29 | 3.97 | | |
| 3 Months | Group A | 10 | 14.70 | 5.59 | 0.54 | 0.85 |
| | Group B | 10 | 14.16 | 4.00 | | |
| 6 Months | Group A | 10 | 14.68 | 5.60 | 0.68 | 0.82 |
| | Group B | 10 | 14.00 | 3.99 | | |

From Table 2, it can be observed that the mean marginal bone height on distal aspect of flapless site (Group A) was 14.94+/-5.60mm,14.79+/-5.61mm,14.70+/-5.59mm,14.68+/-5.6mm during pre-op, immediate post-op, at 3rd month post-op and at 6th month post-operatively. And in the flap site (Group B) was 14.41+/-4.00mm,14.29+/-3.97mm,14.16+/-4.00mm,14.00+/-3.99mm during pre-op, immediate post-op, at 3rd month post-op and at 6th month post-operatively. It was statistically insignificant.

TABLE 3

| Comparison of Mean Marginal Bone Height between Mesial & Distal side at different time intervals in Group A | | | | | | |
|---|---|---|---|---|---|---|
| Time | Side | N | Mean | SD | Mean Diff | P-Value |
| Pre-op | Mesial | 10 | 15.19 | 6.63 | 0.25 | 0.44 |
| | Distal | 10 | 14.94 | 5.60 | | |
| Immediate Post-op | Mesial | 10 | 14.98 | 6.52 | 0.19 | 0.61 |
| | Distal | 10 | 14.79 | 5.61 | | |
| 3 Months | Mesial | 10 | 14.89 | 6.52 | 0.19 | 0.58 |
| | Distal | 10 | 14.70 | 5.59 | | |
| 6 Months | Mesial | 10 | 14.82 | 6.49 | 0.14 | 0.58 |
| | Distal | 10 | 14.68 | 5.60 | | |

From Table 3, it can be observed that the mean marginal bone height on mesial aspect of Group A was 15.19+/-6.63mm,14.98+/-6.52mm,14.89+/-6.52mm,14.82+/-6.49mm during pre-op, immediate post-op, at 3rd month post-op and at 6th month post-operatively. The mean marginal bone height on distal aspect of Group A was 14.94+/-5.60mm,14.79+/-5.61mm,14.70+/-5.59mm,14.68+/-5.6mm during pre-op, immediate post-op, at 3rd month post-op and at 6th month post-operatively. It was statistically insignificant.

TABLE 4

| Comparison of Mean Marginal Bone Height between Mesial & Distal side at different time intervals in Group B | | | | | | |
|---|---|---|---|---|---|---|
| Time | Side | N | Mean | SD | Mean Diff | P-Value |
| Pre-op | Mesial | 10 | 15.03 | 3.85 | 0.62 | 0.36 |
| | Distal | 10 | 14.41 | 4.00 | | |
| Immediate | Mesial | 10 | 14.87 | 3.81 | 0.58 | 0.36 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Post-op | Distal | 10 | 14.29 | 3.97 | | |
| 3 Months | Mesial | 10 | 14.67 | 3.84 | 0.51 | 0.41 |
| | Distal | 10 | 14.16 | 4.00 | | |
| 6 Months | Mesial | 10 | 14.61 | 3.83 | 0.61 | 0.36 |
| | Distal | 10 | 14.00 | 3.99 | | |

From Table 4, it can be observed that the mean marginal bone height on mesial aspect of the flap site (Group B) was 15.03+/-3.85mm,14.87+/-3.81mm,14.67+/-3.84mm,14.61+/-3.83mm during pre-op, immediate post-op, at 3rd month post-op and at 6th month post-operatively. The mean marginal bone height on distal aspect was 14.41+/-4.00mm,14.29+/-3.97mm,14.16+/-4.00mm,14.00+/-3.99mm during pre-op, immediate post-op, at 3rd month post-op and at 6th month post-operatively. It was statistically insignificant.

## V. CONCLUSION

Within the scope of this study, it can be concluded that the flapless technique of implant placement has a slight edge over the conventional flap technique. However, the results of the current study cannot be perceived as significant evidence as its translation into substantial clinical outcomes requires further research. The subjects who participated in the present study should be followed up over a longer period of time to determine the survival and success rate of the implants and also to evaluate the stability of the soft and hard tissues after loading. Advanced radiographic aids should be used to evaluate the changes in the soft and hard tissue parameters over a long period of time. Immunological and microbiological parameters can be assessed to gain a better perspective of the peri-implant changes.

From this present study, it was found that:

1. Both the procedures resulted in marginal bone loss at different time intervals, but both are statistically not significant.
2. High level of accuracy, precision, and safety can be obtained by using CBCT for evaluation.

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