Flapless Implant Surgery : An Overview

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Abstract: *As osseointegration is now considered highly predictable, the current trendis to develop techniques that can provide function, esthetics, and comfort with aminimally invasive surgical approach. To achieve those goals, flapless implantsurgery using a tissue punch technique has been suggested. This paper presents anoutline of the indications and advantages of flapless implant surgery for delayed placementand loading protocols.*

Key words : Flapless, Minimally Invasive, One-Stage, Tissue Punch.

INTRODUCTION

Dental implant therapy has been used frequently for the rehabilitation of missing dentition, It is replacing conventional treatment options like Fixed bridges and Removable partial dentures in many clinical situations of one or more missing teeth.[1-2]

The surgical procedure for placement of implants to replace posterior teeth normally begins with an incision to uncover the osteotomy site. Conventionally, a two-stage surgical approach using submerged implants was advocated with the concept that a healing period of at least 3 to 4 months should be allowed to provide a load-free environment and undisturbed healing for successful osseointegration.[3]The concept that implants should be covered by tissue to ensure primary stabilization and reduce infection was standard of care in the original concept of surgical protocol.[4] This is now being challenged as unnecessary with flapless surgery for implant placement.

REVIEW OF LITERATURE

Studies have recommended the use of a one-step punch technique for many clinical situations requiring implants.[30] These include a wide bony ridge, presence of a broad zone of keratinized tissue, the absence of vital structures, and surgery requiring difficult and complex flap manipulation. This technique has also been used when primary anchorage and stabilization were predictably obtained and to maintain the integrity and topography of adjacent hard and soft tissues. For patients who cannot discontinue use of anticoagulants and patients with meticulous plaque control, one-punch surgery is useful.

Landsburg and Bichacho (1998)[5]recommended use of a one step punch technique for many clinical situations requiring implants.These include a wide bony ridge,presence of a broad zone of keratinized tissue, the absence of vital structures, and surgery requiring difficult and complex flap manipulation. This technique was also used when primary anchorage and stabilization were predictably obtained and to maintain the integrity and topography of adjacent hard and soft tissues.For patients who cannot discontinue use of anticoagulants and patients with meticulous plaque control, one punch surgery is useful.

Campelo and Camera (2002)[6]used flapless surgical procedures and placed 770 implants in 359 patients over a 10 year period.They reported a success rate of only 74% in 1990 but a 100% success in 359 patients over a 10 year period.They reported a success rate of only 74% in 1990 but a 100% success rate in 2000.Each patient was examined after 3 months,6 months,1 year and then once every year.Prosthesis was removed,if possible,and implant mobility was assessed,periapical radiographs were obtained, and periodontal probing was performed.

Implants were considered failed if they had mobility or pai,had to be removed,or if they showed more than 0.5mm of bone loss per year and signs of active periimplantitis.They called flapless surgery a “blind” surgical technique but said advantages include less time and minimal bleeding, with no suturing necessary.They also stated that patient selection and proper surgical technique were essential factors for success.

In a 2 year study by Becker et al (2005)[7], 79 implants were placed in 57 patients from 24 to 86 years old using a minimally invasive one stage flapless technique.The parameters evaluated were total surgical time, implant survival,bone quality and quantity, implant position by tooth type, depth from mucosal margin to bone crest, implant length, probing depth, inflammation, and crestal bone changes.Thirty two implants were placed in the maxillae and 42 were placed in mandibles.The cumulative success rate was 98.7%. For remaining implants, changes in crestal bone over time were clinically insignificant, as were mean changes for probing depth and inflammation.The results of this study demonstrate that by following specific diagnostic and treatment planning criteria, flapless surgery using a minimally invasive technique is successful and predictable.The benefits of this procedure are reduced surgical time, minimal changes in crestal bone height, probing depth, and inflammation, minimal haemmorhage, and less postoperative discomfort.

Tae Ju Oh et al (2007) demonstrated successful use of flapless implant surgery for both immediate and delayed loading protocols in the esthetic region.Advantages of the flapless implant surgery shown in the cases included less traumatic surgeryand decreased operative time, which resulted in accelerated postsurgical healing, fewer postoperativ

complications, and increased patient comfort and satisfaction.Especially with the immediate loading protocol, the advantages were more pronounced because of the absence of a waiting period before prosthetic restoration.

Another advantage of the flapless implant surgery was in preservation of soft tissue profiles, including the gingival margins of the adjacent teeth and the interdental papillae.This is attributed to the avoidance of flap reflection, which might cause postsurgical bone resorption and soft tissue recession.

Nadine Brodala (2009) reviewd the current literature with regard to the efficacy and effectiveness of flapless surgery for endosseous dental implants. Only clinical(human) studies with five or more subjects were included.The available data on flapless technique indicate high implant survival overall.The prospective cohort studies demonstrated approximately 98.6 % survival,suggesting clinical efficacy,while the retrospective studies or case series demonstrated 95.9% survival,suggesting effective treatment. Six studies reported mean radiographic alveolar bone loss ranging from 0.7 to 2.6mm after 1 year of implant placement.Intraoperative complications were reported in four studies,and these included perforation of the buccal or lingual bony plate.Overall,the incidence of intraoperative complications was 3.8% of reported surgical procedures.It was concluded that flapless surgery appears to be a plausible treatment modality for implant placement ,demonstrating both efficacy and clinical effectiveness.

Presently, one piece Implants with implant therapy utilizing the one-stage surgical protocol (nonsubmerged implants) has also been available, and its successful use has been proven comparable to the two-stage surgical approach[10-11]

With the high predictability of osseointegration, the current trend is geared toward developing methods to enhance patient function, esthetics, and comfort.

Along with continuous improvements in implant materials, designs (macrostructures and microstructures), surface treatment and placement techniques, clinical usage of immediate implant non functional loading has been adopted in implant therapeutics, thus providing patients with enhanced function, esthetics, and comfort.

Clinical Considerations

TABLE 1

Indications of the Flapless Implant surgical procedure

1. *Wide Bony Ridge*
2. *Presence of a wide Zone of Keratinized tissue*
3. *Absence of Vital Structures in the anatomical region*
4. *Surgical procedures requiring Complex Flap manipulation*
5. *Patients on Anticoagulant therapy who cannot stop these medications*
6. *In cases where Predictably the surgeon can obtain a Primary stability with the Implants.*
7. *Not suitable in ridges with concavities and parabolic shaped ridges*
8. *Need for an experienced operator with sound clinical judgment*

TABLE 2

Limitations of Flapless Implant Procedures.

1. *Not suitable in ridges with concavities and parabolic shaped ridges*
2. *Need for an experienced operator with sound clinical judgment*
3. *Absolute necessity for using axial tomography or CT for pre-operative evaluations.*

TABLE 3

Advantages of the Flapless Implant surgical procedure

1. *Reduced trauma*
2. *reduced operative time*
3. *Faster soft tissue healing*
4. *fewer complications*
5. *Improved Patient comfort*
6. *Patient resumes normal diet and Oral Hygiene habits following the procedure*

TABLE 4

Disadvantages of the Flapless Implant surgical procedure

1. *Inability to visualize anatomic landmarks.*
2. *Possibly thermal bone damage secondary to inadequate irrigation during osteotomy preparation (In cases where Surgical templates are used)*
3. *Malposed angulations*
4. *Inadequate depth of implant placement (if soft tissue width is not taken into consideration)*
5. *No access to contour the osseous ridge to facilitate restorative procedures, if required.*

Some factors considered detrimental to this treatment modality include lack of direct visibility, difficulty in evaluation of any existing facial osseous defects.

FLAPLESS IMPLANT PLACEMENT

In case of immediate implant placement, the clinical procedure for the flapless placement technique starts with an atraumatic extraction of the unsalvageable teeth. Drilling is then performed through a surgical template with the use of a buccally placed guiding finger, to avoid perforating the buccal bone. Autogenous bone chips collected from the drill flutes may be packed around the implant in case of any existing gaps. Finally the round edges may be approximated and sutured. This not only provides better primary closure but also avoids post-operative soft tissue complications.

In the delayed implant placement protocol, gingival tissue punching is done to remove a piece of soft tissue and expose the bone for implant placement. This reduces post-operative soft tissue recession.

DISCUSSION

Advantages of the flapless implant surgery, include less traumatic surgery and decreased operative time, which result in accelerated postsurgical healing, fewer postoperative complications, and increased patient comfort and satisfaction.

Another advantage of the flapless implant surgery is preservation of soft tissue profiles, including the gingival margins of the adjacent teeth and the interdental papillae. In our opinion, the

remaining buccal bone thickness after implant placement should be at least 2.0 mm to minimize postsurgical resorption. This is in agreement with the critical facial bone thickness of 1.8 mm proposed by Spray et al. [12] The critical facial bone thickness must be carefully analyzed when surgical stents are constructed.

The feasibility of flapless implant surgery with immediate loading [13]or with delayed loading [14]has been demonstrated. However, prerequisites for the flapless implant surgery have also been reported; these include sufficient bone width and height, adequate keratinized soft tissue, and an absence of significant tissue undercuts.[15]

First, sufficient amounts of available bone and keratinized tissue are necessary because direct visualization of bone topography is limited and sacrifice of some keratinized tissue, although minimal, is inevitable in this particular technique. For example, required bone volume for the placement of a standard endosseous root-form implant. [16]Computer software's like SimPlant and NobelGuide definitely aid in increasing the precision of surgical templates in guiding the direction of implant drilling.Although debatable, the presence of peri-implant keratinized tissue is regarded beneficial, especially for the longevity of rough surfaced implants.[17]An adequate amount (i.e., more than 2 mm) of keratinized tissue must remain on the facial aspect of the implant site after tissue punch. If the soft tissue is insufficient or not expected to be esthetically pleasing after the flapless surgery, soft tissue grafting procedures or papilla regeneration techniques should be considered. In addition to the factors described previously for case selection, precautions should be taken during surgical and prosthodontic procedures.

Because of the lack of visibility of hard tissue contours in the flap, it is extremely crucial during implant site preparation to place implant drills against surgical stents using the full length of the apicocoronal drill orientation. Incorrect angulation of implant drills can cause perforation of the cortical plates, usually on the buccal aspect, resulting in dehiscence or fenestration. Although not presented here, perforation of the buccal plate is generally detected by palpation or by observation of implant threads through the soft tissue. With regard to immediate loading, primary stability should be confirmed with hand-torquing of the provisional abutment. If any movement is noted during hand-torquing, a delayed loading protocol should be considered.

CONCLUSION

Flapless implant surgery using a tissue punch technique can be successfully employed when replacing posterior teeth. Careful diagnosis and treatment planning are essential. The protocol for this procedure includes proper evaluation of bone type, height and width of the residual ridge, and amount of available keratinized tissue. The surgical technique should include use of a surgical stent, appropriate use of rotary punches and implant burs, and an osteotomy that promotes a stable implant.

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LIST OF PHOTOGRAPHS

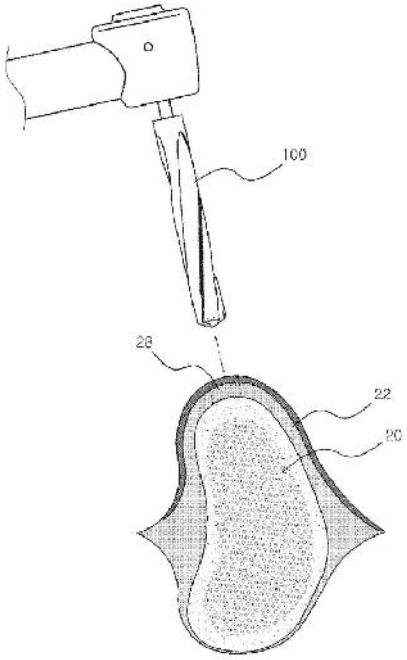

Figure 1- Drill used for Flapless Implant Surgery

Fig: 2 Pre- Treatment Photograph

Fig: 3 Post- Treatment Photograph