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Flapless surgery using tissue punch: A review of literature and case report

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Abstract

Implant dentistry has evolved from traditional conventional flap therapy to a highly esthetic driven discipline. The flapless surgical approach was introduced in the late 1970s by Ledermann to overcome the bone resorption process. However, over the past decade in medicine it has been established the concept of minimally invasive surgery, consisting in taking advantage of advancements experienced in diagnostic technique and specific surgical instruments to perform surgical procedures as less damage as possible to the patient. The aim is to procedure a thorough review of the literature published on the field of implantology with minimal invasive, flapless surgery to determine the current scientific evidence of the technique, along with illustrating the result with different clinical cases. After the present clinical study and the review of literature, we can say that flapless surgeries improve patient comfort and reduce treatment time, and should be restricted to well selected cases in which a proper clinical, radiological and surgical guide planning has been made. Patient treated with anticoagulant drugs or medically compromised equally can be benefitted by the minimal invasion technique.

Keywords: Flapless, tissue punch, minimally invasive, dental Implant, surgical guide.

Introduction

The problem of missing tooth has trouble mankind ever since time immemorial, with advancement in, material sciences and improvement in understanding of occlusion and the Gnathostomatic system, better modalities of tooth replacement were all concern with the three primary goals of comfort, functions, and esthetic and any development which benefited in these goals was popularized.[3]

Implant dentistry has evolved from traditional conventional flap therapy to a highly esthetic driven discipline. The flapless surgical approach was introduced in the Late 1970s by Ledermann to overcome the bone resorption process.[34]

Oral endosseous implants are successful even long term in the single tooth situation. At insertion the primary stability is obtained by mechanical fixation. The secondary implant stability will result from Osseointegration, a process characterized by the development of an intimate bone contact with the implant surface. The direct anchoring of the bone to the implant predicts the climatic success of the implant. Inflammation of peri-implant lesion and /or movement of the implant impair the osseointegration process[569]

Modern implantology is based on a concept of surgery with flap elevation. The first incisions followed the protocol designed by Branemark, performed in the oral vestibule and mucosa, so when flap was sutured back in placed. It has been found that dental implants that placed after reflecting flaps shows some bone resorption. During the initial phase of healing bone resorption of varying degree almost always occur in crestal region. The extend of alveolar height reduction is related to the bone thickness at each specific site. This approach is associated with some degree of morbility and discomfort which also include postoperative blood loss and hemorrhagic and pain and discomfort for the patient.[8]

Reflecting the flap has been a cause of concern regarding the bone resorption around the implants. Campelo and Camara explained around this phenomenon in their 10 yrs. retrospective study to show bone loss in the crestal area. Van der Zee et al in their study, concluded that bone loss occurs after flap reflection, along with gingival recession.

An innovative technique of implant placement without elevating a mucoperiosteal flap, described as flapless /non-invasive implant surgery, has been introduced recently. It has a distinct advantage such as no suture are required and no soft tissue flap is reflected, decreased surgical time, maintenance of soft and hard tissue reduced bon loss, and potentially reducing post operative discomfort and swelling.

The success of oral implant treatment depends on the surgery between patient factors, treatment planning, surgical technique, prosthodontics and technical aspects of the implant restoration.

It is relatively new technique and literature lack sufficient documentation for its credibility to be implemented in routine clinical practice. The purpose of the present article is to review and compare this treatment modalities and its effects on the bone, with conventional procedure.

Advantages of flapless surgery

Many are the advantages that have made flapless surgery of dental implants an act increasing demanded by clinicians and patients.

1. Only small amount of tissue over the onset of edentulous ridge is removed (no incisions)
2. Minimal interference on blood supply due to flapless.
3. Faster healing of soft tissue due to reduce surgical trauma. As a result, the necessary process of healing of the wound is minimal.
4. As no flap is reflected no suture are required. Thus, reduce postoperative swelling and discomfort of the surgical area.
5. Reduction of bleeding: This feature of minimally invasive surgery makes it especially indicated in elderly patients together with certain pathologies (diabetes, immunodeficiency) in which it is essential to induce the minimum possible damage to the patient.
6. Reduced surgical time. However, proper pre-operative radiograph, surgical guide etc. is important to have a better knowledge about the bone contour.[1234]
7. Increase patient comfort and lower morbility. The postoperative period of flapless technique shows less symptomatic in contrast to conventional surgery and

patient are more comfortable and satisfied with the treatment.

Disadvantages of flapless surgery

1. The true topography of the underlying available bone cannot be observed clinically because the mucogingival tissues are not raised.

2. Another concern regarding flapless technique is the presumption that some amount of epithelial tissue could be carried to the osteotomy site.[4] Which is highly undesirable because it might affect the complete osseointegration on to the implant surface and thereby resulting in implant failure.

Case report

A 58year old male reported to the development of prosthodontics with the compliant of missing teeth on the right lower back tooth region which was extracted years back due to caries. He had difficulty in chewing food so, he wanted to replace the partially edentulous [Fig 1] area with a fixed prosthesis. After an initial intra oral examination, treatment options of a fixed partial denture and implant supported prosthesis were discussed with patient, the patient decided to go for implant supported prosthesis in 45 and 46 as this is the only option which was more predictable and conservative to the remaining teeth.

Preoperative

Patient had no significant medical history and was a non-smoker. The intraoral examination showed he had good oral health. The residual ridge had sufficient width mesiodistally and buccolingually and was covered with healthy keratinized mucosa. Pre operative orthopantomogram (OPG) for evaluating the bone structure. Clinically the bone evaluation of the edentulous area was done using a bone Caliper **[Fig.2].** Impression was made with alginate impression material, for both the upper and lower arch followed by fabrication of customize template with transparent acrylic and GP point placed in the area where implant was planned.[Fig.3]

Preoparative CBCT was taken along with the customize template which was used for assessing the available bone, distance from vital structures, bony defects, implant angulation, size etc.

Procedure

The surgical field was prepared and the implant site was anesthetized with 2% lignocaine 1:80,000 epinephrine. The surgical stent was first placed in patient's mouth and the implant site was marked with the help of the pilot drill.After marking the implant site, the surgical stent was then removed. A 4.5mm diameter rotary tissue punch [Fig.4] was placed in a slow speed handpiece and was positioned over the initial osteotomy to blanch the tissue and create an outline of the punch. The punch was rotated through the tissue to the residual ridge. A tissue plug was removed [Fig 5,6] revealing the initial osteotomy made by the pilot drill in the center of the osseous ridge followed by subsequent drills of increasing diameter and final drill up to the decided depth and angulation to create an osteotomy site, [Fig 7] two 4.2mm diameter and 13mm length ADIN implant were then placed in the 45 and 46 osteotomy site. The implants were placed slightly below the level of alveolar crest. Healing abutment were then screwed to the implant [Fig8] immediately after implant placement. This ensures that gingiva grows back around the gingival former not above it, hence, no suturing and no second stage surgery is necessary. A baseline radiograph was taken. [Fig 9]

Post-operative instructions

Were given to the patient regarding diet, oral hygiene, antibiotics and analgesic for 5 days postoperatively. Patients were recall after 24 hours for review

Impression making

Patient was recalled after 1month for radiographic evaluation. After implant placement was left for osseointegration following early loading protocols that is 3months for mandible.[7]Patient was recall after 3months, healing abutment was removed and closed tray transfer copping was screwed and a radiograph was taken to checked the proper setting of the copping. A rim lock perforated tray was selected of adequate size and impression was made with poly vinyl siloxane material using direct impression technique, putty loaded in the selected tray light body was injected around the copping area. The impression was send to the laboratory for the fabrication of screwed retained prosthesis with shade of A2 .The final prosthesis was tried in the patient mouth and occlusion was adjusted, after the final trial the prosthesis was fixed and digital radiograph was taken to checked for proper seating of the prosthesis followed by composite filled of the screw hole.

Radiographic assessment

Three radiographic [IOPAR] reading were planned to assess the bone level around the implant.

1. Baseline
2. 1 month
3. 3 months**[**Fig10]

It was measured by measuring the interproximal height of bone which was defined as the distance measured between the apical ends of the first thread of the implant to the most coronal point of the interproximal crestal bone.

This value was recovered using the digital IOPAs taken. The paralleling cone technique was used. The SORPO imaging software was used to make all the measurements on the radiograph. The sensor was attached in a sensor holder [Fig 11] and positioned in the mouth parallel to the long axis of the implant. This X- ray sensor holder consists of a plastic ring on which the X-ray was being taken. The ring was joined by a stem to the X-ray sensor support and patient's putty bite were used to keep the system stable. In order to reproduce the position of the X-ray taken at baseline, this putty index was used for every other three recall visits so that the position of the X-ray tube sensor and the implant angulation becomes reproducible making the system standardized.

Discussion

Management of edentulous area has been revolutionized by dental implants. Dental implant therapy has replaced most of the conventional method of treating edentulous patients and has become a highly predictable treatment modality.[3]

Flapless surgery can be done either by punching a minimum amount of soft tissue or directly drilling through the soft tissue this results in reduce bleeding, pain, post-operative swelling and discomfort.[4] No need of second stage surgery and suture removal. Thus, results in faster healing and reducing amount of crestal bone resorption Yaffe et al concluded that most of the resorption occurs in early healing phase. In addition, flapless surgery maintains soft tissue architecture, and decreases the operating time.

A study on animals has also shown that when implants were placed without flap elevation, both the amount of osteointegration and bone height around the implants were significantly greater than that of implant placed with flap elevation.[34]

Elevating both the hard and soft tissue during treatment planning with proper radiographic investigation is very important for flapless implant placement evaluation of hard tissue with bone caliper and the site require >=5mm of facio-lingual width and =8mm height. Soft tissue evaluation is also important one should asses for thickness, keratinized tissue, the quality of the fibro

mucosal attachment etc.[14] The relation of the soft tissue to the underlying bone, implant position and planned emergence profile should also be considered. Roman GG stated that the interproximal crestal bone loss was of practical importance and statistically significantly less following the use o flap design versus the widely mobilized flap procedure.[4] Rousseau P advocated that flapless approach is a predictable procedure when patient selection and surgical technique are appropriate. Sanna AM, Molly L, Van Steenbeugh that the flapless treatment protocol described result in good implant survival rate even after several year.

Summary and conclusion

1. Flapless techniques provide various advantages and also few disadvantages.

2. While selecting the cases we should keep in mind for preoperative radiographic investigation, ideal quantity and quality of hard and soft tissue biotype.

3. There is significant mean difference in crestal bone loss from baseline to six months after implant placement. Which are the clinical advantages of flapless implant surgery over the conventional techniques.

4. Within the limitation of this study, flapless techniques decreases trauma, rapid healing time, reduce pain, reduce rate of infection, rapid healing time, reduce pain, improved patient compliance and decreased bone loss and inflammation due to improved vascularity.

5. Thus, proper patient selection is essential to go with flapless implant surgery.

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Legend Figures

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

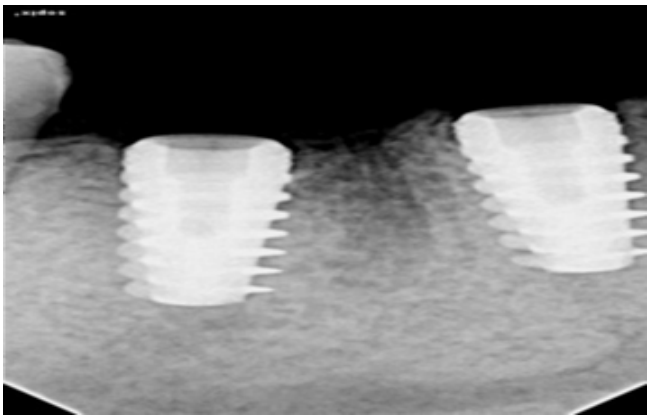

Figure 9

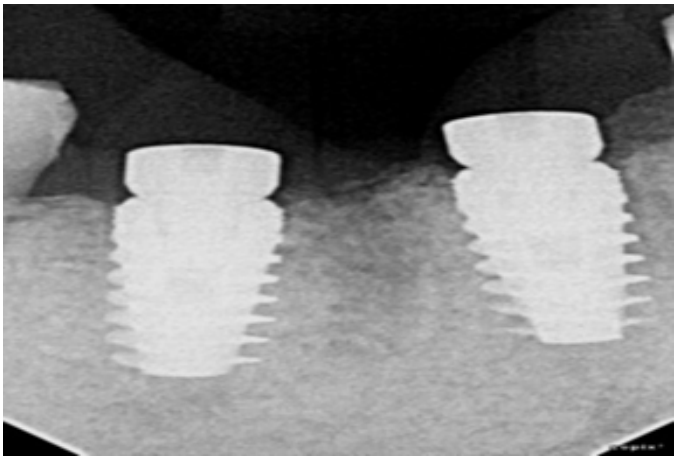

Figure 10

Figure11