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THE AMOUNT OF THE KERATINIZED TISSUE ON TRANS-MUCOSAL TECHNIQUE VERSUS PUNCH TECHNIQUE IN FLAPLESS IMPLANT SURGERY

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ABSTRACT

The aim : Of this study is to show which technique can be enhance the amount of keratinized tissue width (KTW) to improve the soft tissue profile after flapless implant placement.

Materials: A 14 patients (6 women and 8 men) aged between 25-70 years with mean value (47.5 years) were enrolled in this study. First group consisted of seven patients in which implants were inserted through trans-mucosal flapless technique, while the second group consisted of seven patients in which implants were inserted via punch flapless technique then the normal flapless surgical protocol for implant insertion was used and implant was covered by healing cap screw. KTW measured immediately before and after the surgery and at the time of the prosthetic finalization (3-4 months) for maxillary anterior and premolar regions.

Results: KTW at 1-2 mm (before) can be effectively increased, while no significant effect at 5 mm can expected. For the punch technique the mean value of KTW of 1-2 mm showed significant increase at 3-4 months postoperative .

KEY WORDS: Flapless implant, Punch technique, Keratinized tissue width.

INTRODUCTION

Since the osseointegration of implants is nowadays not the big issue, the current trend in dental implantology is to develop techniques that can provide function, aesthetics and comfort [1,2]. Major aesthetic concerns include papilla preservation, the keratinized soft tissue and predictable soft-tissue margins around dental implants. Flap reflections cause postsurgical bone resorption, which may negatively affect the emergence profiles of papillae and implants, especially in the anterior maxilla[3]. Implant placement using minimally invasive one-stage flapless techniques has the potential to minimize soft-tissue inflammation, crestal bone loss, duration of the procedure, suitable for patients under anticoagulants and postoperative patient discomfort [4,5].

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Flapless surgery refers to penetration of the alveolar mucosa and bone without reflecting a mucoperiosteal flap [6]. Avoiding flaps reduces postoperative patient discomfort and, possibly, scartissue formation. Leaving the periosteum intact on the buccal and lingual aspects of the ridge improves the blood supply to the site, reducing the likelihood of resorption [5].

The flapless technique is usually considered in conjunction with single-stage implant placement, where the coronal aspect of the implant protrudes transmucosal and a second surgical exposure is not necessary [7]. Clinical preconditions for the single-stage technique are good bone quality (type I or II), adequate bone width (at least 4.5 mm) and bone height, without undercuts of more than 15 degrees, at least 5 mm of keratinized soft tissue (because the flapless procedure requires the removal of some tissue), and the ability to gain primary stability of the implant [5]. Minimally invasive one-stage flapless procedures in the maxillary anterior region are usually considered in conjunction with functional or non-functional immediate loading [8-11]. Immediately loading dental implants shortens the treatment time and facilitates a favorable aesthetic appearance during the entire treatment period [12].

Since visibility is reduced with the flapless technique, it is more difficult to ensure that the implant is positioned in the center of the crestal bone, greater ridge width offers an extra margin of safety, the flapless technique have also drawbacks as needs cone beam computerized tomography (CBCT) and skillful operator [5].

MATERIALS AND METHODS

In the present study, fourteen implants were inserted in fourteen patients for replacing missing teeth in maxillary anterior and premolar regions. A full medical history was obtained from the patients to exclude any systemic diseases could affect implant success, a thorough dental history was obtained to evaluate the patients' attitude towards the dental therapy, Inspection to assess the general oral hygiene, occlusion, general condition of the existing teeth, condition of the oral mucosa, amount of attached gingival mucosa at the planned implant site, and available inter and intra-arch space. The radiographic examination was include CBCT was taken for every patient to show the quality and the quantity of the bone, to measure the dimension of the bone in area of implant placement, and the proper direction for implant position.

The patient was given a dose of Augmentin 1g capsules (Amoxicillin 875 mg+ Clavulanic 125mg) orally one day before implant insertion as a prophylaxis and every 12 hours for 5 days postoperative, and instructed to use Hexitol mouthwash (Chlorhexidine HCl 0.125%) 3 times one day before surgery and 5 days postoperative.

All implants were done under local anesthesia in a strict aseptic surgical protocol technique. The 14 implants were randomly divided into two groups:

Group I consisted of seven patients in which implants were inserted through transmucosal flapless technique as the round surgical bur was mounted on the reducing handpiece attached to the Physiodispenser under copious saline irrigation was used directly to made point on crest of the ridge guided by the surgical implant guide that was constructed before on the stone cast, then the pilot drill was used to determine the measured length of the planned implant with subsequent drilling as the implant manufacture rules without use of the surgical guide to avoid heat generation and bone necrosis, then implants were covered by healing cap screw.

Group II consisted of seven patients in which implants were inserted via punch flapless technique was harvested with a motor driven circular tissue punch also guided by the surgical guide that was done on the stone cast, then the fullsplit dissection was excised and the normal flapless surgical protocol for implant insertion was used and implant was covered by healing cap screw.

The study implant was Straumann implant Roxolid (tissue level) is the first Titanium-Zirconium (TiZr) alloy material designed specifically for dental implants. It is stronger than pure titanium and has excellent osseointegration properties [13,14]. This combination of properties is unique in the market, there is no other metallic alloy which unifies high mechanical strength and osteoconductivity (Fig.1).

With outstanding mechanical properties, Roxolid Implants may allow you to use smaller-diameter implants with the same clinical performance as regular-diameter titanium implants, smaller implants have the potential to preserve peri-implant structures and avoid invasive bone grafting procedures [15].

All the implants in both groups were clinically evaluated immediately, 1, 2, and 4 months post-operatively to assess the surgical area to detect any pain, swelling, wound dehiscence, or any sign of purulent infection, and the same time to measure the width of the keratinized tissue around the implant that calculated by the mean of four margins (buccal, lingual, mesial, and distal) by the aid of the periodontal prob.

Radiographic follow-up by CBCT done at the time of second stage to assess the osteointegration, and the prosthetic stage was carried out 3-4 months postoperative.

RESULTS

All of the fourteen-implant sites did not have any bony fenestrations after osteotomy as confirmed with a periodontal probe on the bony walls.

In the two cases in whom 4.1-mm-diameter regular neck implants were used, the gaps between the soft-tissue access (5-mm diameter) and trans-mucosal polished collar (4.8-mm diameter) were negligible. Therefore, there was no requirement to use the soft-tissue core saved from the punch technique for grafting.

In one case the initial stability of the implant was slightly compromised, but a decision was made to leave the implant non-submerged, the patient was advised to follow a soft diet for at least 1 week postoperatively and cautioned to avoid mastication on that side of the implant for duration of 3 weeks.

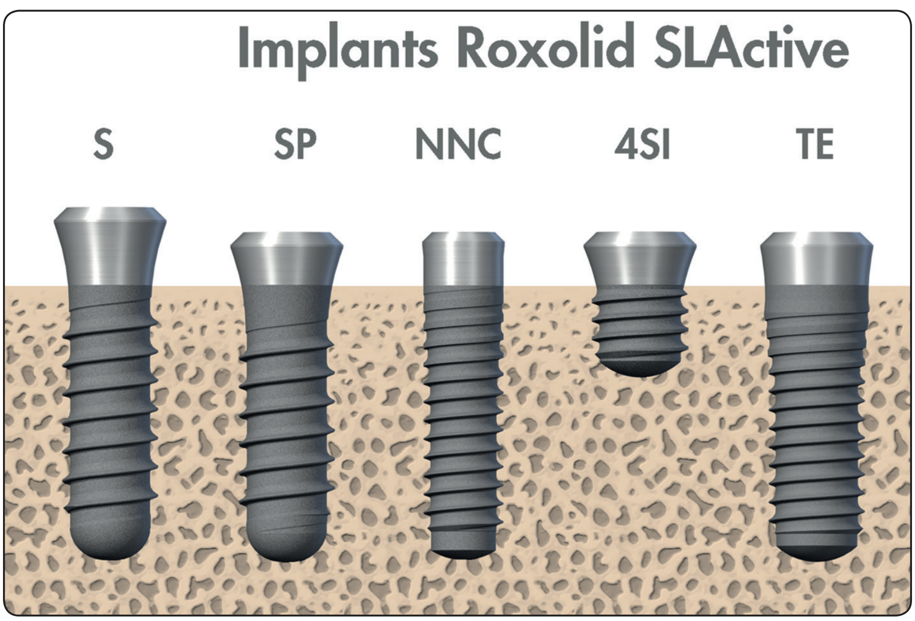

Fig. (1) The Staumann Roxloid tissue level dental implants.

The lack of primary stability was due to poor bone quality of the site rather than the minimally invasive technique used.

The primary stability was good for the other three cases in whom 4.8-mm-diameter wide neck implants were placed.

Two of the three cases were found to have incomplete seating of the healing abutments after immediate postoperative radiographic assessment. For patient 1, it was due to soft-tissue interference. This was immediately rectified by appropriate removal with a 15°C blade. Proper reseating was then verified with another periapical radiograph. As for patient 4, it was due to bony interference at the mesial aspect of the transmucosal collar of the implant. Because the patient was unable to have immediate correction of this issue, a follow-up appointment was subsequently arranged about 12 days postoperatively. At that time, the healing abutment had loosened because of spontaneous re- sorption of the bony interference. It was then reseated without further minor surgical correction and then verified with a periapical radiograph.

All 5 cases exhibited excellent soft-tissue architecture preservation at 1 week post- surgery with minimal edema, and there were no complaints of pain during the early postoperative healing period. All of the implants achieved successful osseointegration, and this included the patient with compromised primary stability (patient 5).

The soft-tissue architecture remained stable with preservation of adequate attached gingival throughout the healing period of the implants, contributing to an esthetically pleasing and biologically sound result after final restorations.

DISCUSSION

The original protocol proposed by Brånemark et al[5] advocated using flaps incorporating vestibular incisions. Site osteotomy is carried out in the usual manner, and after implant placement, the surgeon accommodates the flap for closure.

Flapless implant surgery has numerous advantages over the routine open flap technique.[4,6,7] Advantages include preservation of circulation, soft-tissue architecture, and hard-tissue volume; decreased surgical time; improved patient comfort; and minimization of postsurgical morbidity. The patient is able to resume normal activities and maintain oral hygiene procedures almost immediately.[4] As evident in all of the cases in this series, excellent soft-tissue architecture preservation was observed at 1 week postsurgery with minimal edema. None of the patients complained of pain during the early postoperative healing period. The soft-tissue character remained stable throughout the healing period of the implants, contributing to an esthetically pleasing and biologically sound result after final restorations.

However, this approach affects the ability of the surgeon to visualize anatomic landmarks and vital structures, therefore increasing the risk of implant malangulation, inappropriate placement depth, and damage to vital structures. There is also decreased ability to contour osseous structures and the potential for thermal damage of bone due to reduced access for external irrigation during site preparation. The most significant drawback would be the limited ability to manipulate soft tissues to ensure proper circumferential adaptation of adequate keratinized tissues around transmucosal implant structures.[4] Therefore, before attempting minimally invasive surgery, the surgeon should be well versed with the indications and techniques of conventional open flap surgery.

All of the patients in this case series underwent detailed surgical and prosthodontic evaluation prior to surgery. The most important issues addressed at this stage were the bone volume adequacy for implant placement and soft-tissue dimensions.

The bony assessment was done with the aid of CBCT, and the implant positioning was planned to ensure that vital structures such as the inferior alveolar bundle and the maxillary sinus would not be violated and that no bony fenestration would occur during osteotomy and/or implant placement, which would necessitate converting the case into an open flap procedure.

In all cases, there was no bony fenestra- tion after osteotomy. This was achieved because the appropriate implant dimensions were selected based on the CT findings and the surgery carried out in strict accordance to the planned positions as dictated by the surgical guide. During the CT analysis, the bony anatomy of all of the cases was assessed to be ideal for implant placement in the planned positions, and therefore, the implants could be placed in the exact locations dictated by the surgical guide. There was no need to alter the implant angulations.

Ideally, the crest of the ridge should be flat with respect to the planned implant angulation. However, the surgeon must remember this may not be the case all of the time. The CBCT provides accurate information regarding the ridge morphology but only as far as the slice thickness allows. Therefore, minor bony discrepancies of less than 1 mm may not be detected. Hence, the surgeon must make sure that proper countersinking is done before implant insertion, so that the implant can be placed to the correct depth without interferences from minor uneven crestal bone contours. For patient 4, the healing abutment was incompletely seated due to minor bony interference at the mesial aspect of the transmucosal collar despite the countersinking. This was discovered after immediate postsurgical radiograph. The problem was resolved 12 days later on follow-up, when the bony interference had resorbed. The healing abutment was then reseated uneventfully. At the time of surgery, the author felt that the countersinking could have been insufficient and thereby resulted in this complication.

Soft-tissue assessment was the other important issue. At least 2 to 3 mm of attached soft tissue, preferably keratinized, is recommended to remain circumferentially around the healing abutment following implant placement. [1,6] This was in fact the main criterion for case selection to undergo this noninvasive technique. All of the cases in this series fulfilled this criterion before surgery. This is an important criterion as this recommendation of soft-tissue architecture allows the implant and its restoration to better with stand the trauma of masticatory forces, restorative procedures such as impression registering, or abutment connections as well as oral hygiene measures such as tooth brushing and flossing.

It should be remembered that the tissue punch used for the wide neck implants was 6 mm in diameter, which is 0.5 mm less than that of the transmucosal smooth collar (6.5 mm). This is a special consideration as compared with flapless placement of a dental implant without such a transmucosal smooth collar or an implant with a collar of the same diameter as the tissue punch. Soft-tissue interferences due to the discrepancies of the transmucosal collar tissue punch diameters would be expected, and therefore, appropriate measures must be adopted to ensure complete seating of the healing abutment. The author overcomes incomplete healing abutment seating by actually using the healing abutment itself as a punch. This is achieved by employing a manual milling action of the healing abutment on the transmucosal smooth collar, trimming off any excess tissue interferences, and then removing them. The final seating of the healing abutment is checked manually by feeling for an abrupt snap as it fits onto the transmucosal smooth collar. This would then be verified by relevant postsurgical radiographs.

CONCLUSION

A noninvasive approach for surgical implant placement is a useful technique that can be used in situations in which ideal osseous and soft-tissue anatomy is present on a residual ridge. However, the surgeon should first be well versed with conventional flap procedures to put flapless surgery in proper perspective. With good case selection following detailed clinical and radiographic examination including CBCT, this minimally invasive technique can lead to successful outcomes.

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