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CASE REPORT

Osteotome Assisted Implant Placement In Atrophic Narrow Ridges

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ABSTRACT

In this 21st century, where patient are more demanding in terms of esthetics and opt for fixed retained prosthesis, implant replacement of missing teeth with life like results has become the standard of care. The technique of bone expansion with osteotome offers the possibility of placing implants in cases of bone atrophy without the need for other more complex treatments. In addition, it improves the quality of bone surrounding the implants and reduces the time for rehabilitation. This procedure can be implemented in patient with good bone quality and narrow ridge with thick cortex and some cancellous bone in mandible. In addition it improves the bone quality around the implants and reduces the treatment time.

The use of endosseous implants for one or more missing teeth with excellent long-term success has been well-established. Placement of endosseous implants requires sufficient height and width of alveolar bone. One of the main criteria during implant placement is the presence of at least 1 mm of bone around the implant. A major problem encountered after the tooth extraction is the loss of hard and soft tissue . Bone resorption is an inevitable consequence of tooth loss. In extreme cases, vertical resorption can progress to reach the basal bone and horizontal resorption may lead to a thin bone. The resorption may progress to the extent that, it may make an implant placement almost impossible[1]. However, the ability to regenerate maxillary and mandibular bone and soft tissue using suitable augmentation methods and materials has extended the range of implant treatment.[2]

Many different techniques have been used to modify the amount and direction of bone growth[3].

Bone grafting procedures with the application of synthetic materials or combinations of two or more graft types are frequently

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used.[4,5]Chisels have also been used to separate the maxillary cortical components and widen the bone crest – the latter in turn being filled with graft material, followed by implant placement one year later.[6,7] Nentwing[8] used the same technique, though with immediate implant placement. In 1994, Summers [9-12] presented the first cylindrical-conical expansion osteotomes with gradual increase in diameter from one instrument to the next, whereby Many different techniques have been used to modify the amount and direction of bone growth[3].

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Treatment of atrophic ridge especially in posterior mandible poses a great problem in achieving successful results with endosseous implants. Although there are different techniques available for reconstruction of atrophic ridge, there are chances of surgical risk, postoperative morbidity and multiple surgeries. Ridge expansion technique using osteotomes can be used to gradually expand the ridge by taking advantage of the slight increases in diameter of the osteotomes. By using increasingly larger osteotomes the ridge can be expanded and allow for the placement of an adequate width implant.This clinical report describes the use of osteotome assisted bone expansion of atrophic posterior mandibular ridge and anterior maxillary ridge in patients with narrow alveolar ridge width.

Case Report 1

A 21 year old male was referred to the Department of Prosthodontics with a chief complaint of missing left maxillary central and lateral incisors (fig 1). His medical history was satisfactory.

Various treatment options were discussed with the patient. However, the patient was keen on a fixed-prosthesis. It revealed that the labio-lingual width of the bone in the region of 21 and 22 was 3.5mm, which was not sufficient for the conventional implant placement procedure. Hence, osteotome assisted bone expansion was

Fig.1: Missing 21 ,22.

planned, and the detailed procedure was explained to the patient and written consent was obtained.

Fig.2: Horizontal & Vertical Incisions

Surgery was performed after administering prophylactic antibiotics and under local anesthesia. One horizontal and two vertical releasing incisions (fig. 2) were given to allow maximum access and visualization. The mucoperiosteal flap was elevated which revealed a very thin labio-lingual bone. Using a round carbide bur an intial ditch was given on the ridge at the proposed implant placement site, using an implant drill of 2.00 mm diameter the osteotomy was extended to a depth of 10mm. The bone was slowly expanded by gently tapping in a chisel (fig 3) with the hand

Fig.3: Bone Expansion Using Chiesel

mallet until the resistance was felt. An osteotome 2.2mm diameter was tapped into this initial hole. The osteotome was held in place for about one to two minutes (fig 4), then it was removed and reinserted and tapping was done again till the resistance was felt. The procedure was repeated until the desired width for the placement (3.3 mm) was achieved. Once the desired expansion of the bone was achieved. Subsequently, the implant of 3.3x10mm dimension was placed in position (fig 5). The implant was tightened with a hand wrench obtaining a final torque of 35 N. The healing screw was secured on to the implant after the evaluation of primary implant stability. The mucoperiosteal flap was meticulously sutured (fig 6). The patient was instructed for soft diet and oral hygiene maintenance. Patient was recalled after seven days and the sutures were removed.

Regular follow up was done.

Fig.4: Osteotome Assisted Expansion

Case Report 2

A 45 year old female was referred to the Department of Prosthodontics, with a chief complaint of missing left mandibular 1st molar and right mandibular 1st and 2nd molar. Her medical history was not relevant. All the possible treatment options were discussed with the patient, considering the patient's desire and clinical situation a implant retained fixed prosthesis was planned. The implant placement in the mandibular right 1st and 2nd molar region was carried out in a conventional manner. However, the labiolingual thickness of bone in the left mandibular 1st molar region was 3.8mm, which was not sufficient for the conventional implant placement procedure. Hence, osteotome assisted bone expansion was planned, and the detailed procedure was explained to the patient and an written consent was obtained.

Surgery was performed after administering prophylactic antibiotics and under local anesthesia, after elevation of a full thickness

Fig.5: Placement Of Implant

Mucoperiosteal flap, a round carbide bur was used to provide an initial ditch. Followed by use of pilot drill of 2mm diameter. An osteotome was placed into this osteotomy site. The bone was slowly expanded using an osteotome 2.2mm diameter by gently tapping it with the hand mallet until the resistance was felt. The osteotome was held in place for about one to two minutes, then it was removed and re-inserted and tapping was done again till the desired length of 10 mm was achieved.(fig 7.8)

The procedure was repeated until the desired width 3.75 mm and length 10mm was achieved.

Subsequently, an implant of 3.75x10mm dimension was placed in position. The implant was tightened attaining a final torque of 40N. The healing screw was secured on to the

Fig.6: Sutured Site

implant and flap sutured. Patient was provided with post operative instructions recalled after seven days for suture removal.

Regular follow up was undertaken.

Fig.7: Osteotome In Place

INVESTIGATIONS

Radiographic and routine blood investigations done.

OUTCOME AND FOLLOW-UP

The implants placed showed no signs of inflammation and were stable.

DISCUSSION

The alveolar process is subjected to continuous remodeling. Tooth loss leads to an enhanced resorption of the alveolar ridge,[13-15] and according to Woolfs' law, the loss of function leads to a decrease in bone density.[16] Sufficient bone volume and density are key factors for implant stability and, consequently, successful implant treatment.[17,18] Implants placed in low-density bone may have reduced

Fig.8: Osteotome Induced Bone Expansion

initial stability, which may lead to poor osseointegration during early healing phases.[19,20].Bone condensation can improve the mechanical retention of implants placed in area of reduced bone density. Hence osteotome assisted bone expansion aids in the lateral condensation of bone and thus increasing the primary stability of implants.

The heat generated during implant surgical site preparation with a high-velocity hand piece is well described in the literature, even when proper saline irrigation is used.[21-23] The osteotomes are gently inserted into place or tapped to the desired depth using a surgical mallet. During this procedure, heat generation is not likely. Therefore, use of the osteotome technique instead of drills for implant surgical

site preparation reduces this potentially harmful effect.

We have observed that if conventional placement of implant using drills is done on thin ridges there is a *'saucer shaped defect'* or loss of 2-3 mm labio/lingual cortical plate which in turn decreases the proposed osteotomy length for the implants and either we have to redo the osteotomy to the desired depth or use a shorter implant than proposed or else the implant would be placed supracrestally based on the amount of bone loss. However, such a defect was not appreciated while implant placement using the osteotome technique.

Narrow alveolar crests make implant bed preparation difficult. To avoid these problems, different regenerative surgical techniques have been developed using autologous or homologous bone grafts, xenografts or bone substitutes to allow implant placement in one or two surgical steps.

Another technique for ridge expansion is called ridge splitting. This technique involves creating a trough down the middle of the ridge to allow for gradually expanding the ridge with spreaders or chisels. After implant placement there will be gaps in the bone that need to be grafted. Additional grafting is often not necessary when using osteotomes.

What these techniques have in common versus use of an osteotome is that their use usually means that implant placement will have to be delayed a sufficient amount of time before implants can be placed. By expanding the bone during the implant procedure the implant can be placed at the same time, which significantly decreases the length of time necessary to complete the case. In the ridge expansion technique the osteotome is used to gradually expand the ridge by taking advantage of the slight increases in diameter of the osteotomes. By using increasingly larger osteotomes the ridge can be expanded and allow for the placement of an adequate width implant.

LEARNING POINTS/TAKE HOME MESSAGES

Osteotome assisted bone expansion

• Used in cases of narrow alveolar ridge where conventional implant placement is not a option.

• Results in a single stage correction without significant increase in surgical risk and need for multiple surgeries.

• Aids in the lateral condensation of bone and thus increasing the initial stability of implant.

• *'saucer shaped defect'* is not seen as observed in conventional technique.

PATIENT'S PERSPECTIVE

The patients were stable and did not had any complications pre or post operatively

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