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Maxillary sinus lift using osteotomes: An indirect approach for implant placement in atrophic posterior maxilla

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Abstract---The maxillary posterior edentulous region presents many challenges in implant dentistry. Deficient alveolar ridges often jeopardize the placement of implants in posterior maxilla. This problem mostly occurs when due to ridge resorption, sinus pneumatization is encountered. The procedure of choice is the elevation of the floor of the sinus with the use of the osteotome technique so as to increase the alveolar ridge height for the placement of implant. The purpose of this case report is to demonstrate indirect maxillary sinus lift procedure through alveolar crest using osteotomes to prevent perforation of sinus lining during implant placement and restoring the implants using early loading protocol.

Keywords---implant, indirect sinus lift, early loading, posterior maxilla.

Introduction

Sufficient bone volume helps in supporting and stabilizing the implant body. The posterior edentulous maxilla is always a challenge because of the sinus membrane. The Schneiderian membrane which lines the sinus is adherent to the underlying bone and other structures which are near the inferior border of the sinus, the alveolar ridge and the maxillary posterior teeth. (Small *et al.*, 1993) As the edentulous area continues to atrophy, there is a continuous loss of bone

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density and height and an increase in antral pneumatization. (Garg, 1994; Thomas, 1990) It is therefore common to find the sinus floor close to the alveolar crest. The enlargement of the sinus at the expense of the alveolus after tooth extraction is due osteoclastic activity of the periosteum of the increased Schneiderian membrane. So to rehabilitate such an atrophic ridge, sinus floor elevation becomes pertinent. Maxillary sinus floor elevation was initially described by Tatum in 1970 (Tatum, 1986) and subsequently published by Boyne and James in 1980. (Boyne and James, 1980) The most widely used procedures for lifting the floor of the sinus are-

- Direct approach which includes approaching the sinus laterally and the sinus elevation can be achieved by either one step or two step antrostomy.
- Indirect approach which includes approaching the sinus through alveolar crest.

Summers (1994) proposed the osteotome technique or the indirect sinus lifting. (Summers, 1994) This process is preferred as it is less invasive compared to lateral approach and leads to more localized augmentation of the sinus with lesser degree of post-operative morbidity, and an ability to load the implants early. Contra-indications are sinus infection, tumors or pathologic growth in sinus, severe allergic rhinitis radiation therapy.

Case report

A 53 year old male patient reported to the Department of Periodontology at Desh Bhagat Dental College and Hospital with the chief complaint of difficulty in chewing from right side. On oral examination it was found that the patient had root stump in maxillary right first molar and first premolar (Figure 1). After completing radiographic study it was found that height of residual bone to be 5 mm. Lifting the sinus was pertinent if we had to give the patient implant with a favorable prognosis. It was decided to place a PIVOT MORSE LINE 4.2mm by 10mm implant after lifting the sinus by 5mm using Summers Osteotome Technique in Maxillary Right First Molar and a Dentium NR Line 4.6 by 11mm Implant in Maxillary First Premolar Region.

Procedure

After detailed pre-operative clinical and radiographic examination, the true health of soft and hard tissue was ascertained and this helped in providing necessary diagnostic information necessary for proceeding with the implant surgery. Patient consent was obtained. Available bone height was recorded on standard intra oral peri-apical (IOPA) radiovisuograph (Figure 2). At the day of surgery patient was prepared and was appropriately anaesthetized with local anesthesia. A mid crestal, full thickness incision was made and flap was reflected. After the reflection a 2.0mm osteotome was used to mark the positions of the implants to be placed. The implant osteotomy sites were then prepared to full dimension by osteotomes of increasing diameter. The sinus floor was carefully elevated using Sequential osteotomes and a mallet with controlled force (Figure 3a-e). Once the osteotome prepares the implant sites, the implants were then threaded into the osteotomy and flap was sutured (Figure 4).

Immediate post operative IOPA X-ray was taken (Figure 5a, 5b). The primary stability of the implants was checked and healing abutments were placed and the flap was sutured. Post operative medication and instructions were given.

Discussion

In the past, implant treatment in the posterior maxilla was reported as the least predictable region for implant survival due to inadequate bone height, poor bone density, presence of maxillary sinus. With the advancement in the field of dentistry, implant supported prosthesis are no more a big challenge. In cases where ridge is resorbed and sinus lining is closer to the ridge, there is always a risk of sinus perforation during implant placement, in such situation sinus lift up technique is mandatory thereby increasing the bone height before implant placement. Tatum began to develop these techniques as early as the mid 1970s. (Tatum, 1986) Misch developed four options for treatment of the posterior maxilla in 1987 based on the height of bone between the floor of the antrum and the crest of the residual bone. (Misch, 1995) According to the relative literature, the osteotome technique appears to be a predictable and safe method for augmenting bone at the sinus floor and improving bone density and quality of the implant site sufficiently so that early loading is possible. (Halpern *et al.*, 2006) A surgical technique that minimizes heat generation and pressure necrosis is of particular importance with early implant loading. It is also dependent on the quality and quantity of existing bone at the implant site and the ability to achieve and maintain adequate stability of the implant so that micromotion is kept below the biological threshold. (Vaibhav joshi *et al.*) This case report demonstrated an indirect approach for lifting up the sinus lining using osteotomes and subsequent implant placement with early loading as all the factors were favourable. The advantages of indirect approach is that it is less invasive, involves less surgical complications, shorter healing and waiting period, improves the density of the maxillary bone which helps to get good stability. Sinus floor augmentation by indirect technique along with simultaneous implant placement can be an excellent method for restoring the partial edentulism, if performed by the experienced oral implantologist. Preventing complications requires an understanding of the biomechanical principles involved in surgical management of Schneiderian membrane during sinus lift, perfect attention to the many details involved in the diagnosis and treatment planning and encouraging the patient toward maintaining strict oral hygiene to increase the longevity of the implant.

Conclusion

The indirect/closed sinus lift using osteotomes is an effective and less complicated method for the placement of implants in moderately atrophied ridges of the posterior maxilla. The present surgery gives a new hope to the patients having large maxillary sinus with reduced maxillary alveolar bone height. This method if properly done improves both the residual alveolar ridge dimension and the osseointegration of implants which can be restored using early loading protocol. The reduced healing period thus does not pose any enhanced risk on implantation and maintains the prediction of a similar success rate.



Figure 1. Missing 1st Molar and Root Stump in First Premolar



Figure 2. Root Stump of 1st Molar



Figure 3a. Summers Osteotomes

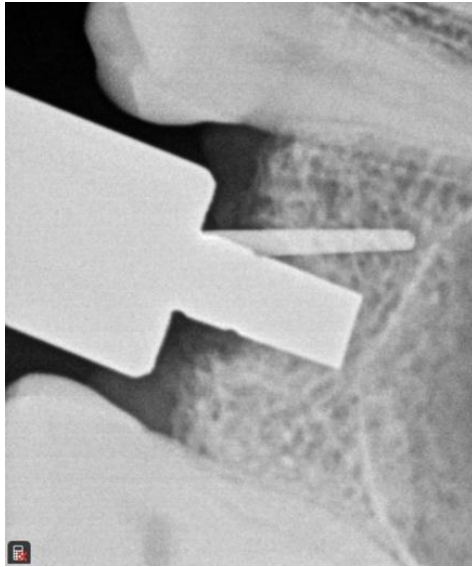


Figure 3b. Summers Osteotomes used in sequential order.

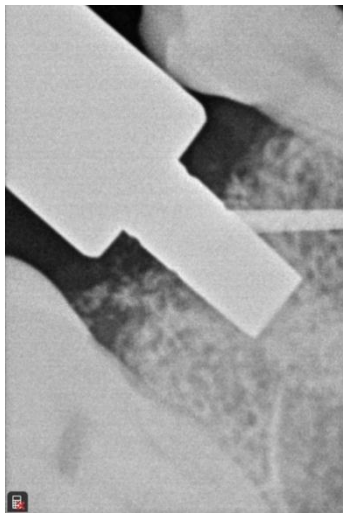


Figure 3c. Summers Osteotomes used in sequential order.

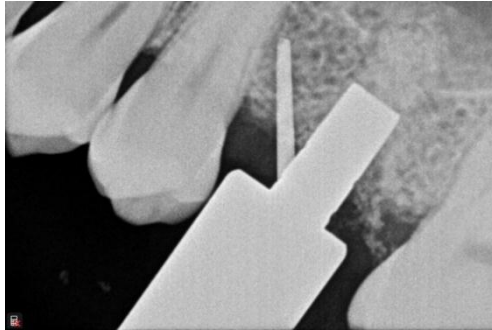


Figure 3d. Summers Osteotomes used in sequential order.

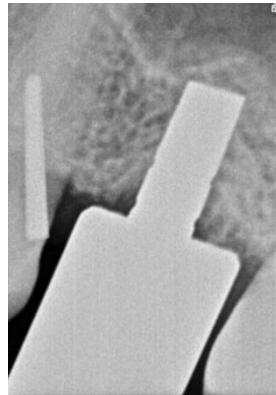


Figure 3e. Summers Osteotomes used in sequential order.



Figure 4. Post op Photo

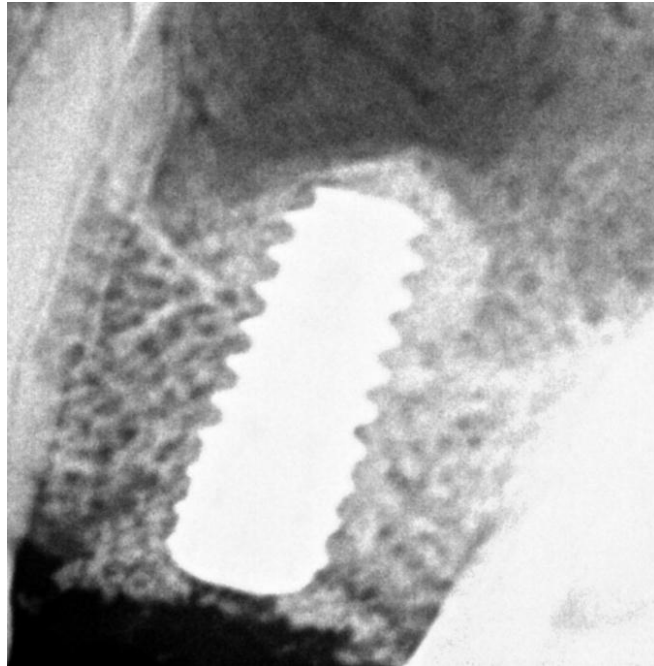


Figure 5a. Implant Threaded in 16



Figure 5b. Implant Threaded in 14

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