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CASE REPORT

MAXILLARY SINUS LIFT USING OSTEOTOMES: AN INDIRECT APPROACH FOR IMPLANT PLACEMENT IN POSTERIOR MAXILLA

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ABSTRACT

The maxillary posterior edentulous region presents many unique and challenging conditions in implant dentistry as deficient alveolar ridges can jeopardize the placement of implants in posterior maxilla. This problem mostly occurs where ridge resorption and sinus pneumatization are often 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.

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INTRODUCTION

Sufficient bone density and appropriate bone volume are crucial factors for successful implant treatment. This helps in supporting and stabilizing the implant body. The posterior edentulous maxilla is always a challenge for the implantologist because of maxillary sinus. 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 are 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 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 to the increased osteoclastic activity of the periosteum of the Schneiderian membrane. So in these cases for the successful implant placement lifting the sinus floor level is performed. 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) In 1987 Misch organized a treatment approach to the posterior maxilla based on the amount of bone below the antrum, and in 1989 he expanded the treatment approach to include the available bone width related to surgical approach and implant design. (Misch, 1987; Misch, 1995) The most widely used procedures for lifting the floor of the sinus are-

1) The direct approach which includes approaching the sinus laterally using either one step or two step antrostomy.
2) Indirect approach which includes approaching the sinus through alveolar crest using an osteotome.

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 and radiation therapy.

Case Report

A 47 years old male patient in good health reported with the chief complaint of difficulty in chewing from right side because of missing teeth in right upper back jaw region. On intra oral examination, right first and second molars were missing (Figure 1). After complete radiographic examination, it was observed that the height of the bone available for the implant in relation to first molar was 6.5 mm and 6 mm for the second molar. After thorough examination it was decided to lift

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up the sinus lining with an indirect approach through alveolar crest using osteotomes and simultaneously place implants of 10 mm length and 4.0mm diameter and restore them using early loading protocol.

Figure 1. Pre operative view of missing 16, 17 region

Procedure

Pre-operatively, patient was subjected to a detailed clinical and radiographic examination of the soft and hard tissue which provided necessary diagnostic information for proceeding with implant therapy. Patient's consent was obtained. Available bone height was recorded on standard intra oral peri-apical (IOPA) X-ray (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 3). Once the osteotome prepares the implant sites, the implants were then threaded into the osteotomy (Figure 4). Immediate post operative IOPA X-ray was taken (Figure 5). The primary stability of the implants was checked and healing abutments were placed and the flap was sutured.

Figure 2. Pre operative IOPA x-ray depicting available bone density and length

Post operative medication and instructions were given. After 10 days sutures were removed. Healing was checked after 8 weeks (Figure 6). Impression copings were placed and impression was made (Figure 7). Implant supported cement retained metal ceramic fixed prosthesis was fabricated (Figure 8). Patient was instructed about the maintenance of oral hygiene by means of dental floss or interdental brush and was recalled for routine follow up.

Figure 3. Indirect sinus lifting using Osteotome

Figure 4. Implant placement after Osteotomy

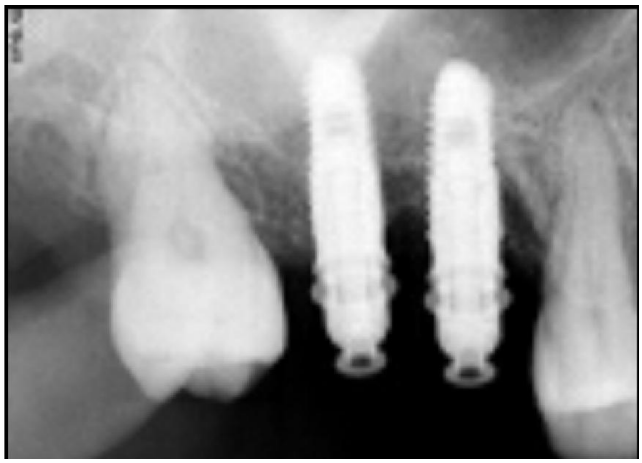

Figure 5. Post operative IOPA x-ray showing sinus elevation and implants placement

Figure 6. Soft tissue profile after 8 weeks

Figure 7. Impression copings in place

Figure 8. Final prosthesis delivered

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 came 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.

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