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Management And Prevention of the Complications Following Maxillary Open Sinus Augmentation, A Case Report

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ABSTRACT

Dental implants have been widely used in the recent years for rehabilitation of edentulous jaws as a successful treatment strategy. The presence of enough bone is a prerequisite and to some extent a challenging concern for severely atrophic areas especially in the posterior maxilla. In order to deal with this problem several reconstructive procedures have been used for both vertical and horizontal bone augmentation before implant placement. Maxillary open sinus lift procedure is a predictable technique for elevating the sinus floor and placing the bone graft in the posterior atrophic maxilla before implant placement while the remaining bone height is less than 5 millimeters. This article represents management and prevention of the complications following maxillary open sinus augmentation.

1. Introduction

Since the dream of osseointegration became a clinical reality in the late 1950s by Per-Ingvar Branemark's experiences, modern dental implants have been used as a reliable treatment option for replacing missing teeth in both partially and complete edentulous jaws. Achieving true osseointegration and survival of dental implants can be influenced by several factors including general health, bone quality and quantity of the edentulous area, implant design and surface and continuing well maintenance considering both oral hygiene and Load-bearing capacity of dental implants for all over the life. Considering the low density of available bone, implants placed in the posterior maxilla may endure significantly greater failures compared with all other intraoral implant positions.

Surgical Implant placement is a challenging procedure in the posterior maxilla because of the inadequate bone volume resulting from both pneumatization of the maxillary sinus along with resorption of alveolar crestal bone following tooth extraction. Numerous procedures used to increase the volume of vertical bone height before implant placement in the posterior maxilla for lifting the schneiderian membrane from the floor of the sinus to an upward position, thus creating a space for bone graft and the implants can be placed simultaneous or after a healing period delayed [1-3].

Boyne and James' for the first time presented maxillary sinus floor elevation using the autogenous bone for placing a blade-like implant in 1980. Numerous graft materials for sinus lift surgeries have been introduced, although in a few cases this procedure can be attained without the use of any grafts in the indirect sinus lift surgery with Osteotome technique [4,5].

2. Risks and Complications

The procedure of maxillary sinus lift and bone augmentation is meticulous and needs surgical conformity and punctuality. Risks and complications of the procedure include:

- Schneiderian membrane perforation or tearing
- Intraoperative and postoperative bleeding,
- Postoperative infection,
- Loss of bone graft or late implant failures.

3. Schneiderian Membrane Perforation or Tearing

The incidence of Schneiderian membrane perforation or tearing varies greatly and is related to several factors such as the anatomy of the maxillary sinus, the membrane thickness, the presence of any infection and inflammation as well as the skill and experience of the surgeon. The maximum incidence of this side effect might happen up to 60% [6-9]

Usually the perforations less than 5 millimeters can often be managed with a resorbable barrier membrane upon the opening area followed by cautious packing of the graft particles under the elevated membrane but in large perforations it will be necessary to stop the procedure, suturing the wound, and at least 6 months later to attempt it again.

Properly positioning of the sinus window margins within 2 to 4 mm especially from the anterior and inferior borders of the sinus in the surgical procedures makes it easier to get straight access to the bony walls that decrease the risk of membrane perforation during the elevation of the sinus membrane. [10-13]

4. Infection

Infections may occur in less than 10% of maxillary sinus augmentation procedures which could be detrimental for the surgical outcomes. The signs and symptoms of sinus graft infection include pain, swelling, inflammation, pus, sinus tracts, and popcorn sign (the exfoliation of graft particles).

For reducing the rate and prevention of infection firstly the surgery should always be done using sterile techniques and devices. Patients should apply a pre-surgical antimicrobial mouthwash (e.g., chlorhexidine) and it is necessary to take pre- and post-operative antibiotics. [14,15]

5. Intraoperative and Postoperative Bleeding

Bleeding might be a risk of any surgical procedure. A complete blood count as well as bleeding time assessment and the patient INR (The international normalized ratio reveals how long it takes for your blood to clot) analysis should be done prior any surgical procedures.

The sinus membrane is highly vascularized and may bleed significantly. [16, 17]

Another reason for uncontrolled bleeding is arterial rupture in the surgical area. The alveolar antral artery in the lateral wall of the maxillary sinus can lead to unexpected bleeding in sinus lift surgery especially while the artery passes through the window which is designed for entering the sinus. If the presurgical three-dimensional radiographs, such as a CBCT scan, show more than 2 millimeter vascular diameter, the surgical approach can be modified to minimize or avoid the risk of a bleeding complication. Serous care should be paid for preventing this arterial involvement during the surgery, otherwise bone wax and topical hemostatic agents must be available to manage this critical surgical complication. [18-21]

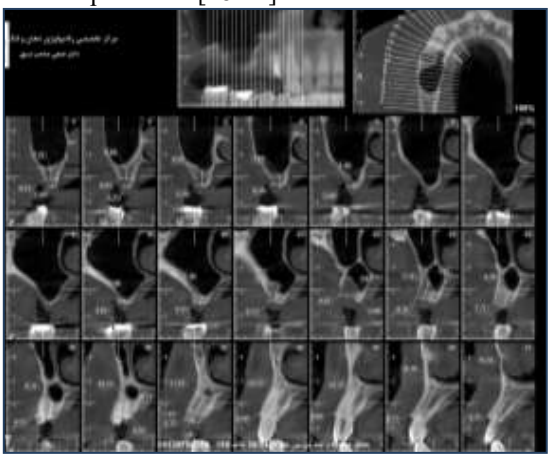

Figure 1: A panoramic image and the CBCT scan showing inadequate bone for direct implant placement in the posterior maxilla. The sinus lift surgery is necessary prior to the implant placement.

Figure 2: The window created on the lateral wall for lifting the sinus membrane meticulously

Figure 3: The graft material has been placed inside the sinus to hold the membrane at the new upward position.

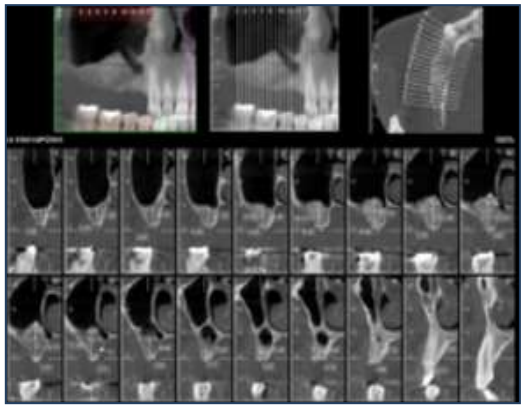

Figure 4: The newly formed bone 6 months after the surgery is obvious at the radiographs prior to the implant placement.

6. Conclusions

In conclusion, maxillary sinus lift surgery is a reliable technique for recunstructing the edentulous posterior maxilla in order to prpperly use standard dental implants. A thorough radiographic and laboratory presurgical evaluation of sinus anatomy significantly lowers the likelihood of complications.

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