

# Bone Added Osteotome Sinus Floor Elevation— A Case Report

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**Abstract:** The resorption of the alveolar bone occurs in the maxilla due to loss of teeth and increase in pneumatization of the maxillary sinus due to high air pressure in the pneumatized sinus cavities. The osteotome technique was developed to compress soft bone improve initial fixation, primary stability in type III and type IV bone. Bone added osteotome sinus floor elevation ensures accurate and better control over the height of the grafted space with reduced chance of membrane perforation.

**Keywords:** X-ray marker, surgical splint, closed sinus lift, bone added osteotome sinus floor elevation, dental implants.

## INTRODUCTION

Dental implant placement in the posterior maxilla is complex and challenging. In the maxilla one of the most important anatomic structure to be considered during dental implant placement is the maxillary sinus also called the Antrum of Highmore.

Edentulism of the upper jaw in the posterior region leads to an anatomical and functional variations. This includes resorption of the alveolar ridge in the vertical and horizontal direction due to pneumatization of the maxillary sinus and decrease in the quality and quantity of bone.

The atrophy of the bone, crest which occur due to edentulism can be treated by bone augmentation and sinus floor elevation.

The procedure for sinus elevation for dental implant placement which are currently in use are

1. Two step lateral antrostomy or lateral window approach
2. One Step lateral antrostomy
3. Osteotome technique.

Based on radiographic imaging, (panoramic/tomographic / CT scan) the alveolar bone height is assessed which determines the approach to bone and instrumentation, bone graft handling and dental implant placement<sup>1</sup> (Fig. 1).

The classical sinus floor elevation is by a lateral window technique which is a two-stage or one-stage procedure where a

lateral window is created, bone grafting done and implants placed after 6 months or simultaneously as described in the flow chart (Fig. 1).

The most commonly used technique lateral window approach for augmentation of the maxillary sinus floor elevation was first published by Boyne and James.<sup>2</sup> Tatum<sup>3</sup> tried to insert the implants simultaneously by performing the lateral approach and the crestal approach.

This technique is more invasive and traumatic to the patient.

Summers<sup>4</sup> in 1994 describe a less invasive procedure using a osteotomy technique or crestal approach to elevate the sinus floor with immediate implant placement.

This technique is recommended for implant site-specific augmentation. If bone graft is added it is called as *Bone Added Osteotome Sinus Floor Elevation*.<sup>5</sup>

The objective of this approach is to maintain the existing maxillary bone by apical relocation .

The advantage of adding bone graft is the repositioned bone particles and trapped fluid create a hydraulic effect, thus

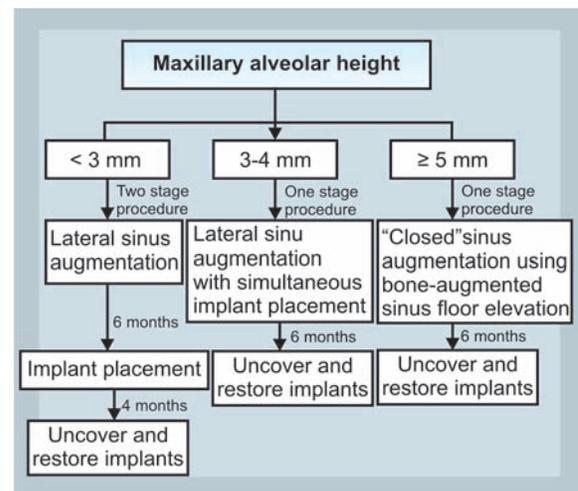


Fig. 1: Radiographic treatment-planning chart

moving the sinus floor and membrane upward. The membrane is less likely to tear under this type of pressure.<sup>5,6</sup>

Endoscopic elevation of the BAOSFE procedure has demonstrated that the Schneiderian membrane has two patterns of elevation relative to the membrane distension, one which the elevation is restricted to the implant apices, and another that yields a border area of augmentation extended over implant apices and laterally to the implant apical contours.

### Case Report

A 45 years male patient presented to our center for replacement of missing tooth # 3. The patient had unremarkable medical history and history free of sinus disease. He was not on any medication and no known history of allergies.

### Preoperative Planning

The preoperative planning involved study models, photographs, radiograph with marker, surgical template and routine blood investigation (Figs 2 and 3).



Fig. 2: Panoramic view with 5 mm marker



Fig. 3: Surgical template

A marker of known diameter 5 mm was used to evaluation of bone height and magnification evaluation of the OPG. The bone height was calculated to be at 5 mm based on the marker.

### Surgical Technique

The patient was asked to rinse with 0.2% colorhexidine gluconate solution for 1 minute. The patient was prepared draped local anesthesia 1: 200000 was used. A full thickness palatally placed mucoperiosteal flap was elevated with the papillae intact (Fig. 4). Surgical template was placed and a round bur used to mark the site of osteotome. Starter drill with depth marking was used to make an osteotomy to the depth of about 4 mm. Then an intrasurgical check X-ray taken to confirm the position of the osteotomy and the distance from the sinus floor (Fig. 5). The quality of the bone was found to be Type III. The smallest osteotome was used to reach the sinus floor (Fig. 6). Different sized osteotome were used not advancing more than 1 mm to expand the alveolar bone in buccolingual and apicocoronal direction. The offset osteotomes were rotated, advanced and withdrawn, making sure the osteotomy site was well-lubricated and circular. The sinus floor was fractured and bone graft added in increments to elevate the sinus floor (Figs 7 and 8). Enough care taken to prevent Off -angled malleting which can create an elliptical osteotomy and compromise initial fixation.



Fig. 4: Palatal incision



Fig. 5: Intrasurgical X-ray



Fig. 6: Initial osteotome

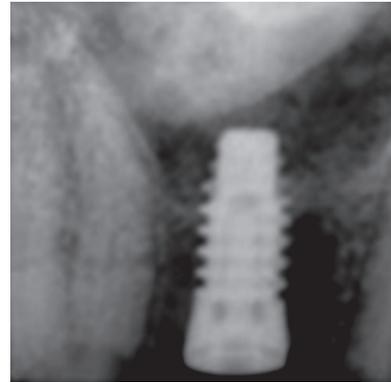


Fig. 9: Radiograph showing final position



Fig. 7: Bone graft added



Fig. 10: incision sutured



Fig. 8: Osteotome used to advance bone material into the sinus

A 4 × 9 mm implant was then placed and used as a final osteotome. A radiograph taken to confirm to final position of the implant. The flap was close with 3-0 vicryl. (Figs 9 and 10)

Antibiotics amoxicillin 500 mg, 1 tid, metrogyl 400 mg, 1 tid and diclofenac sodium 1 bid was prescribed for 5 days along with a mouth gargle. Postsurgical visits were scheduled at 1 week initially and monthly.

### Second Stage Surgery

Six months later the second stage surgery was carried out, the stability of the implant verified and restored with metal ceramic fixed partial denture (Figs 11A and B).



Figs 11A and B: In occlusion and function

## DISCUSSION

The study presents a case of *Bone Added Osteotome Sinus Floor Elevation* with immediate implant placement.

The radiographic imaging shows a bone to be at 5 mm which is ideal for “closed” sinus augmentation using the *Bone Added Osteotome Sinus Floor Elevation*. The implant was restored 6 months later and in function since 2 years. The osteotome technique is less invasive and reduces the treatment time since the implants can be placed simultaneously. The quality and quantity of Type III and Type IV bone commonly found in the posterior maxilla can be increased by *Bone Added Osteotome Sinus Floor Elevation*.

The limitation of osteotome sinus floor elevation are the inadvertent perforations that may not be detected because of visibility. The valsalva maneuver must be performed cautiously, since it can lead to perforation.

Osteotome sinus floor elevation may cause endodontic pathology to an adjacent tooth that may affect the implants.<sup>7</sup>

## CONCLUSION

The *Bone Added Osteotome Sinus Floor Elevation* is a relatively predictable treatment modality with good success rate if proper protocol is followed.

## ACKNOWLEDGMENT

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