Maxillary Sinus Floor Augmentation in Atrophic Alveolar Bone Using Osteotome Technique with a Crestal Approach as Indirect Method: A Case Report

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Abstract: There are various sinus augmentation treatments, and factors influencing dental implant placement and sinus augmentation survival rates are still up for debate. In this case report, an indirect procedure using an osteotome technique and crestal approach was used. When there is more than 6 mm of remaining bone height and a rise of 3–4 mm is anticipated, the osteotome procedure may be advised. If the resorption is more advanced, a direct procedure involving a lateral antrostomy must be carried out.

Keywords: Sinus lift; osteotomy; sinus augmentation.

Introduction:
Maxillary sinus floor augmentation is a surgery done in order to raise the level of alveolar bone in maxilla at its posterior region, around premolar and molar teeth region by raising the Schneiderian membrane and inserting a bone graft [1]. The various terminologies of this procedure are sinus lift, sinus augmentation, sinus graft. As long as tooth is present in the socket, the ridge will be intact [1]. After the tooth has been extracted or lost, it is essential to replace the tooth [1]. On the contrary, if the tooth is not replaced the alveolar bone starts to decrease in height, leaving behind a diminished ridge [1]. Implant procedures become complicated in these cases as it may impinge into the maxillary sinus area due to reduced ridge height [2]. Hence sinus lifting procedure has to be done to increase the ridge height [2]. The goal of the sinus augmentation is to increase the amount of bone that is available to support a dental implant by grafting more bone into the maxillary sinus.

Case Report:
A 30-year-old female was referred to the Department of periodontology with a chief complaint of missing tooth in relation to upper right back tooth region for the past 6 years and wants to replace it. The patient was examined and advised for radiovisiography (RVG) which revealed less bone height approaching maxillary sinus [Fig 1]. Hence sinus lift procedure was considered in this case to increase the bone height.

Local anesthesia was given after which a full thickness flap is elevated in the edentulous area in relation to maxillary first molar. By placing a pilot drill with a 2 mm diameter and stopping it 2 mm short of the sinus floor, an osteotomy was performed. [Fig 2& 3]. After approaching the sinus floor, osteotomy is placed and gently tapped with mallet, thereby increasing the area for graft placement [Fig 4& 5]. Subsequent radiographs are taken until sufficient space is created. Once the area was expanded, bone grafts was added and condensed gently, without piercing the sinus floor [Fig 6]. The sinus membrane is more elevated as a result of the increased bone graft's pressure on it. After the flap was roughly cut and stitched, the patient was given post-operative instructions. Regular follow up of the patient was done and the site was accessed. Radiograph was taken after 6 months and there was an adequate bone fill suitable for implant [Fig 7].

Discussion:
Maxillary sinus is the largest paranasal sinus, with a pyramidal structure which has typical measurements of 38 - 45 mm, 23 - 25 mm and 36 – 45 mm of length, breadth and height respectively. The average level of capacity of maxillary sinus is 15 ml [4]. The infraorbital neurovascular bundle is located in the anterior wall and extends from the inferior orbital rim to the maxillary alveolar process. The thin superior wall serves as the orbit's floor [4]. The posterior superior alveolar nerve, pterygoid plexus of veins and internal maxillary artery are located in the pterygopalatine fossa, which is divided by the posterior wall [4]. The lateral wall of nasal cavity being its medial wall, houses the primary ostium. The primary route for secretory drainage passes through this ostium [9]. The lateral wall gives access for the lateral wall sinus transplant operation. It contributes to the posterior maxillary and zygomatic process and creates the buccal aspect of the sinus.

The first sinus lift procedure was done in the year 1975 by Tatum, after which a successful loading of two endosteal implants were done [2]. Prior to the invention of appropriate devices, inflated catheters were used for a large portion of sinus elevation.

There are 2 types of sinus lift procedures which includes direct known as lateral window method and indirect technique known as transalveolar approach. Through a window made in the lateral wall of the maxillary sinus, the sinus membrane is directly seen and

instrumented in the lateral window technique [5]. Summers described indirect technique using crestal approach, with tapered osteotomes [6].

However in this study crestal approach was done considering the cost effectiveness and as the residual bone height was > 6 mm [7]. Compared to the transalveolar sinus lift approach, the cost of the lateral window technique is a little higher. The greater invasiveness of the lateral approach will also be a key deciding factor from the patient's standpoint. However, if there has been significant bone loss at the implant site, the transalveolar technique is not likely to be successful [8].

Sinus augmentation is recommended in cases where a strong sinus floor is necessary for several implants, such as when there are multiple missing teeth in the posterior maxilla, multiple teeth missing owing to heredity or birth defects, and multiple teeth missing in the posterior maxilla [3].

There are many complications reported in sinus augmentation procedure which more often results in piercing or tearing of the sinus membrane, wherein the surgery is halted at this point and a 3 to 6 month time period is given for healing [9]. Inflammation, itching, soreness, allergic reaction, tissues and neurovascular damage, graft failure, scarring, hematomas, fistula in oro-antral region, implants becoming tilted or loosened, and profuse bleeding are further problems [9].

ACKNOWLEDGEMENTS – nil

CONFLICT OF INTEREST – Nil

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Figure 1: Pre- operative RVG

Figure 2: Osteotomy with pilot drill

Figure 3: RVG taken with drill

Figure 4: Osteotome inserted at the osteotomy site

Figure 5: RVG taken with Osteotome

Figure 6: Bone grafts placed at the site

Figure 7: 6 months post-operative RVG