Conservative Sinus Floor Elevation and Transport of Putty Graft by Osseodensification Drills: Two Cases

AKÇAY HÜSEYİN DDS., PhD., KURU KEREMCAN DDS., ULU MURAT DDS., PhD

Izmir Katip Celebi University,Department of Oral and Maxillofacial Surgery, Izmir , TÜRKİYE

Introduction

Sufficient bone quality and sufficient amount of bone surrounding implants is mandatory for having long-term satisfactory treatment outcome. Especially in the posterior maxilla pneumatization of maxillary sinus and resorption of alveolar bone after tooth loss often compromises dental implant therapy. (1,2)

Lateral and crestal approach are the main techniques for Sinus Floor Elevation (SFE). Sinus floor elevation with grafting through a lateral maxillary osteotomy has been used frequently during recent years to restore alveolar bone.(3) This method, which is also known as sinus augmentation using autogenous bone or bone substitutes, was first pioneered by Boyne and James in 1980 to rehabilitate the atrophic posterior maxilla by increasing the alveolar bone height.(4) While this procedure is relatively safe and predictable, the integrity of the posterior superior alveolar artery is at risk during osteotomy in the lateral wall of the sinus.(5) Therefore, it is imperative to be familiar with the vascular supply of the maxillary sinus in order to minimize both intraoperative and postoperative complications of sinus augmentation and implant insertion, which include surgical bleeding, postoperative membrane perforations and bone necrosis.(6)

Osteotome sinus floor elevation (OSFE) known as crestal approach is generally used in less resorbed maxilla to graft the maxillary sinus in combination with the same time single implant placement in.(7) This technique used a crestal approach to perform a closed sinus lift requiring striking the bone with a surgical mallet until the desired osteotomy depth was reached. Percussive and vibratory forces transmitted by osteotomes and surgical mallets during preparation of implant beds can cause an unfamiliar and rare complication of this method called benign paroxysmal positional vertigo.

Although these procedures has been proven to be predictable with high success rate, various complications as membrane perforation, bleeding etc. have been reported. These complications cause longer operation times and can lead additional complications such as reduction of blood supply, displacement of the graft, compromised graft integration and wound healing. Benign paroxysmal positional vertigo is another rare but uncomfortable complication occurring following osteotome SFE.(8)

The aim of this report is to evaluate the efficacy of novel Densah™ drills to elevate the sinus floor keeping the membrane intact and to use tricalcium phosphate (TCP) putty™ delivered by drills for atraumatic sinus augmentation with simultaneous implant installation and to evaluate their insertion torque and primer stability.

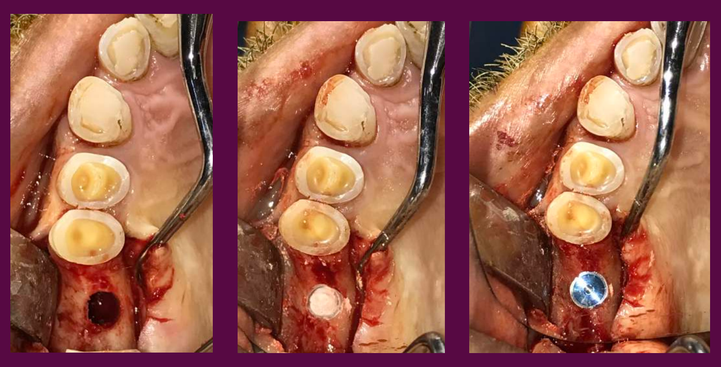

Image 1a,b,c: Socket preparation, filling the cavity with putty graft, implant placement

Image 2: Filling the cavity with putty graft

Image 3: Usage of Densah™ drills for delivering the graft material to elevated sinus cavity

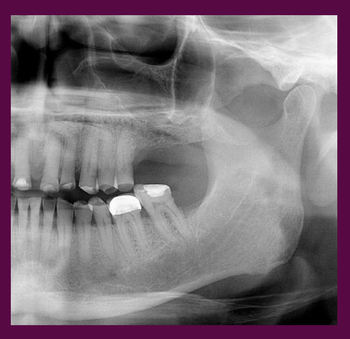

Image 4: Pre-op OPG view

Image 5: Radiographic view after operation

Image 6: CBCT view after the operation

Case Report

Osseodensification concept applied for two patients with a 5 mm and 6 mm of bone height from the crest of the ridge to the floor of the sinus and 5 mm of minimum bone width. Residual bone height was measured preoperatively using panoramic radiographs. Crestal sinus elevation was planned by using special densah burs to breach the sinus floor. Pilot drill was used to the depth determined within an approximate safety zone of 1.0 mm from the sinus floor. 2 mm densah bur was used to the same depth in Densifying Mode. Gentle pumping motion was used with subsequent burs to advance past the sinus floor as the haptic feedback of the bur was felt when reaching the dense sinus floor. Integrity of the sinus membrane was confirmed by clinical examination. After the use of final bur, the putty form bone substitute (Powerbone Putty, Bonegraft Biomaterials, Turkey) was directly injected into the implant socket and delivered to the prepared sinus cavity via the densah bur used in 150 rpm counter clockwise mode. 0,5 to 1 cc putty form TCP graft delivered by repeating this procedure. The sinus membranes elevated safely and 10mm length implants were placed simultaneously. CBCT scans were used to evaluate the augmentation and the sinus floor post operatively.

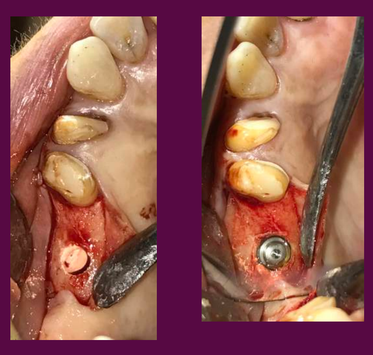

Image 7a,b: Applicaiton of putty graft to prepared socket, placement of dental implant

Image 8: Injection of putty graft to prepared socket

Image 9: Delivering the graft material to prepared sinus cavity using Densah™ drills

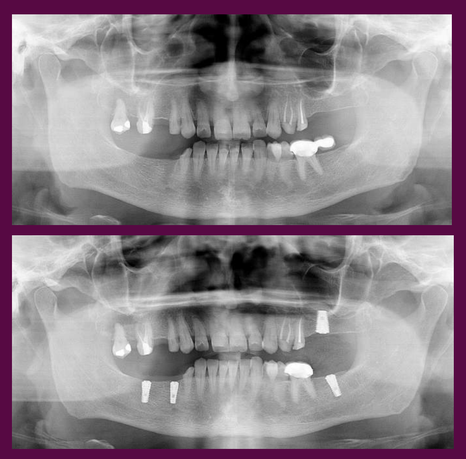

Image 10a,b: Pre-op and Post-op OPG view

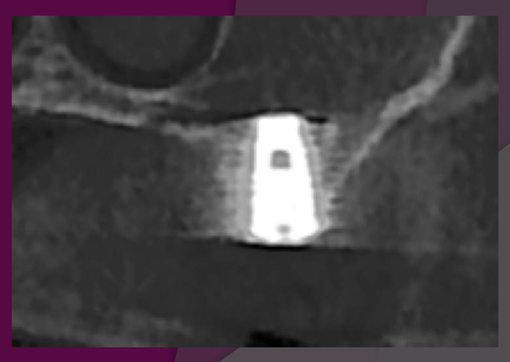

Image 11: CBCT view after the operation

Conclusion

The use of Densah burs in densifying mode can breach the sinus floor with autografting without causing any perforation. If further grafting is desired at the base of the sinus in appropriate cases, the densah burs can be operated counterclockwise and the graft can be delivered to the region. The use of this feature of densah drills with putty form graft material, as we have used, provides an effective and safe augmentation. These simplified minimally invasive antral membrane elevation technique can be an alternative for conventional technics. Considering the complications of the conventional methods, this new concept can give successful results in SFE with a more conservative and simple approach. Moreover increased implant stability is achieved due to osseous densification of the Residual Bone by Densah burs and it is seen as a significant advantage for the maxilla posterior region, where bone quality is generally low. Thus, the proposed technique could be recommended for sites with limited residual height.

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