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SINUS LIFT FOR IMPLANT PLACEMENT USING A MAGNETIC MALLET- A CASE REPORT

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ABSTRACT

Placement of an implant is a complex procedure in maxillary posterior region where the bone height is not adequate with close proximity of the sinus. These situation demands an attempt to lift the sinus lining to avoid any injury to maxillary sinus during implant placement. Magnetic mallet is one of the most innovative surgical device which are able to improve working standards in sinus lift procedure with negligible chances of perforating a mucosa of maxillary sinus. In this case report magnetic mallet has been used to lift the sinus during implant placement which was a non-invasive and non-traumatic procedure. It is comparatively easier and faster than other methods of lifting a sinus.

KEYWORDS: Maxillary Sinus, Sinus Lift, Magnetic Mallet.

INTRODUCTION

The most important aspect of implant placement is the quality and quantity of bone. In maxillary posterior region it is a complex procedure as there is less bone with close proximity of the sinus. The sinus floor is near to the first molar region. The size of the sinus increases with age if the area is edentulous. The extent of pneumatization varies from person to person and from side to side. Nonetheless, this process often leaves the bony lateral and occlusal alveolus paper thin in the posterior maxilla. The maxillary sinus bony cavity is lined with the sinus membrane, also known as the Schneiderian membrane1. These situation demands an attempt to lift the sinus lining to avoid any injury to maxillary sinus during implant placement. Atrophic posterior maxilla is a challenging anatomical area for the placement of dental implants. When there is insufficient residual bone height in posterior maxilla, sinus lift procedure (or residual bone augmentation) is indicated. Sinus lift procedure is a surgical intervention aimed at increasing the height of residual bone in the posterior maxilla by repositioning the floor of maxillary sinus in an upward direction, creating an appropriate bone height that can accommodate appropriately the placement of functional dental implants. There are various techniques for sinus lift procedures such as Lateral Antrostomy, Crestal Approach Using Osteotomes, Balloon Sinus Lift, Hydroneumatic Sinus Lift[1].

Recently magnetic mallet (Sweden Martina) has been introduced,it is the most innovative surgical device which are able to improve working standards in sinus lift and split crest practices. It is a Meta Ergonomically designed magneto-dynamical handpiece , energized by a control unit, delivering preconceived forces by timing of application. The magnetic wave and the subsequent shock wave are modulated regarding the timing of application of the force and induce axial and radial movements applied on the tip of osteotome. No more problems of distress for the patient causing dizziness, vertigo, nausea, Benign Paroxysmal Positional Vertigo (BPPV) due to the displacement of the otoliths in the inner ear with this device.

CASE REPORT

A 57 year old female, systemically healthy, reported in the Department of Conservative Dentistry and Endodontics with edentulous left posterior maxilla and she demanded fixed prosthesis with non-invasive treatment procedures. X-ray (Schick CDR ,Schick Technologies) measurements showed a ridge height of 5mm.All areas had sufficient width for placement of 3.75mm diameter implant(FIG 2). The bone crest was exposed with the tip of the SM64blade (Swann-Morton) (FIG 3a). The proposed implant site was first clearly marked with a 2 mm round drill followed by 2 mm twist drill. Initial drilling of the bone at this site was done to confirm the density of the bone at the site, as bone in the posterior maxilla is generally spongy (type 3 & 4)[2].The implant site was created by expanding the bone tissue both laterally against the pre existing lateral walls and apically moving up and compressing with progressive series of bone expander(Sweden and Martina) and axial force was applied .The osteotome(Sweden and Martina) was inserted upto the working depth and final diameter of the osteotomy was kept less than the anticipated implant diameter. The osteotome were directly attached and pushed by magnetic mallet and a shock wave was pushed on their tip. The electrical mallet imparted to osteotomes a longitudinal movement along a central axis moving up and down toward pilot bone hole providing a driving mechanism of longitudinal movements[2](FIG 3b).Then the sinus lift instruments(Sweden and Martina) were used to slowly lift the sinus upto 3mm(FIG 3c). Once the implant site was expanded, PRF (Plasma Rich Fibrin) and bone graft was placed (FIG 3d). First implant(Adin, Germany) of size 3.75mm diameter and 8mm length was placed with the help of implant drilling device(Adin, Germany) and then the second implant of 3.75 mm diameter and 10 mm length was placed similarly adjacent to the first one with grafting material, BioGraft-HA(IFGL Refractories LTD, Odisha) in place (FIG 3e)

The buccal flap was apically repositioned and stabilised with sutures tied to the margin of the palatal flap and anchored buccally with a loose loop to the periosteum at the level of alveolar mucosa. This suture designed avoided tissue traction in the repositioned buccal flap. The radiograph was then taken to verify the position of implants (FIG 4).

DISCUSSION

Summers proposed a conservative crestal approach using osteotomes for maxillary sinus floor elevation in 1994, but in place of hand mallet has now came an electrical or a magnetic mallet. Hand mallets had a disadvantage of causing incovenience to the patient due to tapping and it may induce BPPV in patients who have not experienced any previous episodes of this vertigo[3]. Magnetic mallet represented by magnetic waves and the subsequent shock wave inducing axial and radial movements applied on tip of osteotome with a fast energy(90daN/8us) as compared to hand mallet(40daN/2ms). The Magnetic Mallet is a Meta Ergonomically designed device Mallet which exploits an electro-magnetic field. Safety, suppleness and ease of use are quality factors leading the device to be considered ergonomic. There is an electronically operated collision between two masses allowing to get a high intensity impact applied in a very short timing; an elastic wave is generated followed by a quantity of motion which expresses itself in an inelastic shock wave on the bone[2].

The plastic deformation is a structural phenomenon peculiar to the great majority of matters which is due to specific forces applied in fixed time[2]. It has a magneto-dynamical handpiece, energized by a control unit, delivering preconceived forces by timing of application. The magnetic wave and the subsequent shock wave are modulated regarding the timing of application of the force and induce axial and radial movements applied on the tip of osteotome [2].

The osteotome is firmly hooked up to the instrument and the application time of the force is the best one to achieve the desired plastic deformation. The device is designed to apply four forces of different strength, from the lighter one to the stronger one. Nevertheless it is important to know that the whole spectrum of forces has a very close progressive range. That's why they can be considered all suitable for surgery practice.

It is more defined in osteotome entry direction and directionality. All deviation in osteotomes directionality can be avoided which is caused by the difference in the density of the different parts of the bone.[2]

Magnetic mallet makes it possible to minimize the risk of intraoperative and post-operative complications, creating an adequate implant site. The conical conformation of spikes, the alternation of apical concavity and convexity, the wide stop and the comfortably sized handles eliminate the need to use a hammer percussively thus reducing the risk of sinus perforation[4]. According to the study conducted by Garbacea et al there is high rate ofsinus membrane perforation during surgery utilizing three different transcrestal sinus floor elevation techniques[5]. Lai et al have published a randomized clinical trial comparingsinus floor elevation with and without grafting materials, reporting membrane perforation rates of 7.8% and 2.6%, with mean residual bone heights of 4.7 and 5.6 mm, respectively[5]. in the present case, PRF and bone graft material was placed which was necessary to keep the bone corticals apart and to serve as scaffolding for the bone neoformation, in the case of bone deficiencies.

CONCLUSION

In the present case report it was concluded that implant success rate and crestal bone levels after alternative osteotome technique that is with magnetic mallet were comparable to those of implants placed in naive bone, showing that this technique is viable for preparing an increased implant site compared to the initial dimensions of the edentulous ridge.

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