

Alternative Treatment Option for Sinus Lifts in Partially Edentulous Posterior Maxilla Using TTPHIL ALL TILT® Technique: A Case Report on Implants with Palatonasal Angulation

Venkat R Nag¹, Puppala Sarika², Smitha Daniel³

ABSTRACT

Rehabilitation of the atrophic posterior maxilla is complicated owing to poor bone quality, non-optimal quantity, and sinus pneumatization. Such clinical situations demand extensive bone augmentations and sinus lifts which prolong treatment time and increase morbidity. Using preexisting anatomic features for implant placement in patients indicated for extensive augmentation surgeries is an alternative treatment possibility. TTPHIL ALL TILT® technique for partial or complete edentulous atrophic maxilla is an immediate function protocol in this direction. In clinical situations depicting severe anterior pneumatization of the maxillary sinus, placement of implants with palatonasal angulation using TTPHIL ALL TILT® immediate function technique that anchor the lateral wall of nose/medial wall of the maxillary sinus by angulating implants in palatal direction present a minimally invasive treatment option for rehabilitation. The purpose of this clinical report was to present implants with palatonasal angulation as a non-surgical treatment option for the rehabilitation of partially edentulous posterior maxilla using the TTPHIL ALL TILT® technique. Follow-up of 3 years showed stable marginal bone levels without any biological or prosthetic complications. The patient showed a high level of satisfaction with the prosthesis and reduced patient morbidity and costs, thus, it is a viable treatment alternative to sinus lift surgeries for oral rehabilitation of maxillary posterior partially edentulous sites.

Keywords: Immediate function, Implant with palatonasal angulation, Lateral wall of nose, Medial wall of maxillary sinus, Sinus lifts, Sinus pneumatization, Tilted implant.

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BACKGROUND

The severely atrophic maxilla may present challenges for conventional implant treatment modalities. Concomitant residual ridge resorption and maxillary sinus pneumatization diminish the available bone in three dimensions impacting the implant treatment modalities in the edentulous posterior maxilla.¹ Additional concern seen in the posterior maxilla is the less dense, more medullar, and thinner quality of the bone.² According to Misch classification, class III and IV residual alveolar ridge height indicates the use of indirect sinus lift technique with delayed implant protocol.³ The management of these conditions in the posterior maxilla has led to the evolution of treatment options that include bone augmentation and sinus lift techniques. Utilizing sinus elevation techniques prolongs treatment time and increases the treatment cost owing to grafting procedures. There is inevitable post-surgical inflammation due to open flap surgeries that include incisions and sutures as well as the use of sinus grafts. The potential complications involving the donor and host sites are graft rejections, oro-antral fistula, pain, and neurosensory disorders with higher morbidity rates. The patient acceptance could be limited due to surgical invasiveness, treatment duration, and associated morbidity. Chronic and acute rhinosinusitis, non-repaired oro-antral fistula, intravenous bisphosphonates therapy, and severe smoking habit are absolute contraindications for sinus augmentation. Besides, volumetric bone graft reduction owing to resorption and the suboptimal quality of new bone have to be considered.⁴

As an alternative to the augmentation procedures and its disadvantages, short implants are placed in the available residual

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bone to avoid sinus membrane perforation. Nevertheless, the required residual bone height for short implants is a minimum of 6 mm.¹ Literature also suggests employing the anterior or posterior or septal wall of the sinus, palatal curvature, zygomatic and pterygoid bones for the engagement of implants.⁴ These techniques require tilting of implants suppressing the need for bone grafting and thus, bringing about better patient acceptance. Mattsson et al. presented a method to visualize the available posterior maxillary bone enabling implant placement angled >30° without bone grafting.⁵ TTPHIL ALL TILT® technique also involves tilting of the implants in either of the following aspects—mesial, distal, palatal, or buccal and has demonstrated success in the partially and completely



Fig. 1: Preoperative panoramic view showing pneumatized sinus at #26 region

edentulous maxilla.⁶ Using this technique, placement of implants with palatonasal angulation tilted buccopalatally engaging the cortical lateral wall of the nasal cavity can be another alternative to morbid grafting techniques. Engaging the cortical bone of the palate provides optimum primary implant stability that can be potentially utilized even in clinical situations with a 4 mm marginal crest width.

Thus, the objective of this article is to describe implants with palatonasal angulation that is an alternative treatment technique to morbid sinus augmentation procedures.

CASE DESCRIPTION

A 30-year-old female patient visited the clinic (The Dental Specialists, Hyderabad, India) with the chief complaint of a missing tooth in the upper left back region for 1 year. She had a history of gag and was highly apprehensive. She hailed from another state and could not come for multiple visits. Past dental history revealed that extraction was done about 1 year back. On examination, #26 was found to be missing. The remaining teeth were sound. She was subjected to panoramic radiography (Vatech India Private Limited, New Delhi, India) that demonstrated pneumatized sinus extending up to the second premolar such that bone height was not adequate for implant placement (Fig. 1). As the patient could not come for multiple visits for a sinus lift, implant placement, and prosthesis delivery, it was prudent to provide fixed implant treatment and immediate function without any sinus augmentations to avoid any delay in the completion of treatment. Therefore, implant with palatonasal angulation using TTPHIL ALL TILT® technique was recommended wherein long tilted implant engage available native cortical bone of lateral nasal wall/medial wall of the maxillary sinus to attain objectives of primary stability and osseofixation, subsequently delivering immediate function. After obtaining signed consent for the proposed treatment plan, oral prophylaxis was done. One hour before surgery, amoxicillin 1 g was given orally and was followed up with 500 mg for 3 times/day for the next 3 days. Using CBCT DICOM data and guided surgery software, virtual planning of implant position allowed three-dimensional visualization before implant surgery (Fig. 2). It also aided in the fabrication of stereolithographic models and stents ensuring precise transfer from the virtual implant position to the clinical situation.

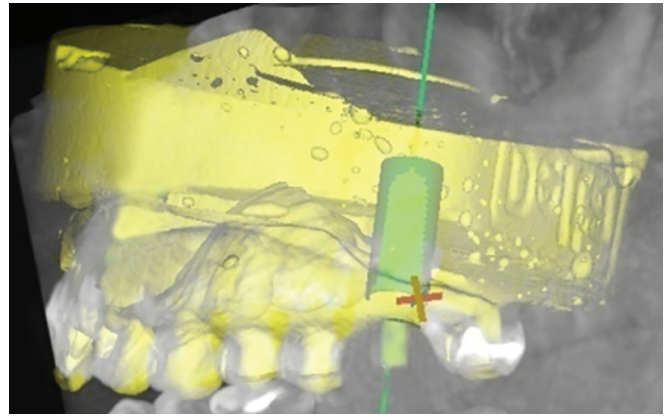


Fig. 2: Implant planning with respect to #26

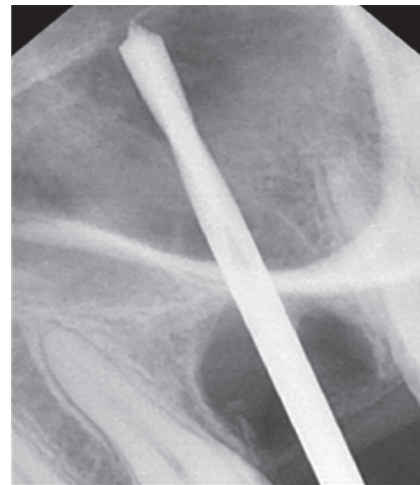


Fig. 3: Radiovisiography showing single drill navigating along maxillary sinus to engage the lateral wall of the nose

Administration of 2% lignocaine hydrochloride with adrenaline 1:200,000 (Lignox 2%) was done. A stereolithographic stent was used for the precise angulation of implant placement in a flapless manner. A 1.4 mm diameter single drill was used to drill at the center of the buccopalatal dimension of the implant site which is the entry point. The drill further navigates along the floor of the maxillary sinus and engages the cortical bone of the lateral nasal wall/medial wall of the maxillary sinus (Fig. 3). The drill is used at a low speed of 400–600 rpm for proprioception of nasal cortex engagement. A cone-beam computerized tomography scan (Carestream, India) was taken to confirm the palatonasal direction. 3.5 × 18 mm tapered implant (Bioline I, Bioline Dental GmbH & Co. KG, Berlin, Germany) mounted on implant driver was driven into the drilled course until subcrestal placement of about 3 mm measured from the crest of distal interdental bone was achieved (Fig. 4). 40 Ncm torque and reverse torquing forces were obtained using torque ratchet.

Implant level single-stage putty and light body impression (GC Flexseed, GC dental, India) were made using open tray transfer copings (Fig. 5). Implant analog was fitted on the transfer coping in completed impression and cast was poured using type-III dental stone (Microstone, Whip Mix Corp., Louisville, KY, USA). Platform switched 25° angulated abutment was placed on implant analog in the cast to compensate the implant tilt (Fig. 6). The final monolithic

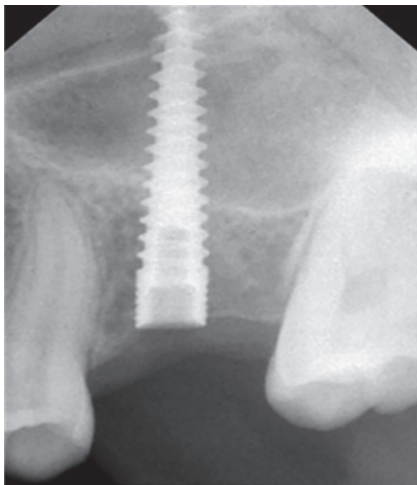


Fig. 4: Radiovisiography showing implant placement with palatonasal angulation



Fig. 5: Open tray impression coping for making an impression



Fig. 6: Angulated implant abutment for compensating implant tilt



Fig. 7: Intraoral buccal occluded view of zirconia crown supported by #26 implant with palatonasal angulation

zirconia crown was fabricated and a try-in of the abutment-crown assembly was done on the next day. Following the bisque trial, final glazing was done and zirconia crown was cemented to an abutment on the cast to remove excess cement and the entire assembly was fixed in the patient's mouth on the same day (Fig. 7). A follow-up of 6 months was uneventful (Fig. 8). One year and 3 years of the review showed optimum soft tissue contour and maintenance of marginal bone levels (Figs 9 and 10).

DISCUSSION

The height at the alveolar crest is often limited for implant installation in the severely resorbed maxilla.⁵ Following teeth extractions, the buccal plate resorbs faster than the palatal plate.⁷ In patients with severe maxillary atrophy, longer palatal bone allows tilted implant placement without bone augmentation surgeries reducing the hospital stay and its associated complications for the patients.⁴ The anatomy of bone within the margins of the nasal cavity, maxillary sinuses, and alveolar crest margin allows angulated implant placement. The lateral wall of the nasal cavity forms the inferior portion of the medial wall of the maxillary sinus continuing into the inferior nasal concha. Parasinus angulation



Fig. 8: Panoramic view of an implant with palatonasal angulation at 6 months review

allows the placement of longer implants that engage the cortical portion of the bone between the nasal cavity and maxillary sinus.⁸ Tilted implant was placed and anchored in the cortical bone of the lateral wall of nasal cavity/medial wall of the sinus, achieving

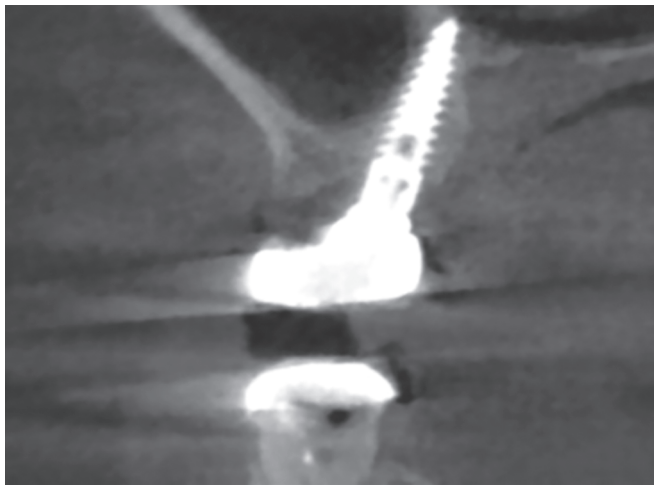


Fig. 9: CBCT view of an implant with palatonasal angulation at 3 years follow-up

cortical anchorage and subsequent primary stability.⁹ A clinical advantage of the tilted longer implant was increased implant-bone contact area and implant primary stability. Additionally, grafting procedures are avoided, thus reducing biological and economic costs and enhancing patient acceptance especially for edentulous patients with only an option of iliac crest harvesting. The advantage of engaging implants in the lateral nasal buttress is the ability to provide osseofixation and subsequent immediate functional loading.¹⁰ Thus, an implant that was placed in a tangential cortical wall can be anticipated to bear sustainable support for prostheses in areas of maximal occlusal loading.⁴

Several studies have documented the usage of tilted implants for successful maxillary rehabilitations. Rosen and Gynther¹¹ have demonstrated the use of implants up to 18 mm in length engaging the cortical bone and a success rate of 97.8% was achieved. Mattsson et al.⁵ described graftless implant rehabilitation for severely resorbed edentulous maxilla wherein implants were placed in the area extending between anterior or anteromedial wall of sinuses engaging the cortical bone of nasal floor or maxillary sinus. In 1984, Branemark et al.¹² placed implants in a palatal position utilizing the native palatal bone that did not lead to any mucosal problems or marginal bone resorption. Peñarrocha et al.¹³ reported that implants placed in residual palatal bone are a feasible treatment method for atrophic maxillary rehabilitation. Furthermore, several studies have shown implant tilting to be an effective and safe alternative to bone/sinus grafting in the maxilla.^{10,14} Implant placement with palatonasal angulation in this case report was unique as the implant entry point was midway between the buccolingual crestal dimension, navigating along the floor of the maxillary sinus, and exiting at the lateral wall of the nasal cavity/medial wall of the sinus. Also, the benefits of the TTPHIL ALL TILT® technique wherein flapless, subcrestal, single drill concepts were harnessed.⁶ Thus, it further minimized surgical invasiveness and benefitted in increased mucoperiosteal blood supply and optimum bone remodeling.

Tilted implant placement in the lateral nasal wall requires radiographic planning using computed cone-beam tomography that reveals the availability and density of the bone in implant placement sites as well as help identify the maxillary sinus wall and nasal cavity to determine the correct fixture positions. Computed



Fig. 10: Postoperative clinical picture of 3-year follow-up

cone-beam tomographic scans are beneficial in precise planning as they are not subject to distortion or superimposition or overlapping of images.¹⁵ Thus, a stereolithographic surgical stent made from CBCT DICOM data aided in the precise positioning of the tilted implant. Nevertheless, the use of this treatment modality in a large number of cases and long-term follow-up evaluation need to be assessed.

Implants with palatonasal angulation using the TTPHIL ALL TILT® technique is a promising surgical procedure for oral rehabilitation of maxillary posterior partially edentulous sites. In this technique, native residual cortical bone and the tilted implant are coupled to maximize the bone-implant contact, thus increasing the primary implant stability and delivering immediate function. It can be concluded that this simplified technique can be an efficient alternative treatment method to any extensive reconstructive sinus lift surgeries with increased patient acceptance and clinical ease.

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