



Oral Rehabilitation with Dental Implants in Patients Suffering from Hypothyroidism – A Case Report

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ABSTRACT:

Thyroid disorders and thyroid hormone medications can have an impact on bone metabolism. The purpose of this case report is to demonstrate a less invasive approach for augmenting the maxillary sinus in order to replace the first molar tooth. In addition, the current technique shows great promise for cases with a low residual bone height. A 61-year-old male non-smoker, who was in good health and did not grind his teeth, came to the dental clinics because he had lost his upper left and right 1st molars. The patient mentioned having hypothyroidism and was prescribed thyroxine (100 mg daily). During a thorough intra oral examination, it was observed that there is a missing tooth in the 16 region. After a thorough discussion of the advantages and disadvantages of each treatment option, the patient and I reached a consensus on the placement of an implant in the missing area. This case report presents a modified surgical approach for maxillary sinus augmentation, aiming to achieve the necessary bone height for successful dental implant placement and restoration. This case report highlights the benefits of minimally invasive surgical procedures for sinus lifting, which result in fewer postoperative complications compared to lateral approach techniques.

Introduction

In the past decade, the success rate of dental implants has been consistently high, ranging from 90% to 95%. Systemic conditions can have a detrimental impact on the Osseo integration process around titanium implants. This is particularly true for metabolic bone diseases like osteoporosis, diabetes mellitus, and hypothyroidism. Bone undergoes two crucial processes that persist throughout life: osteoblastic bone formation and osteoclastic resorption. Consequently, bone is regarded as a remarkably dynamic and active tissue. It is important for dental

surgeons to have a thorough understanding of the various mechanisms and conditions that can impact the response of bone tissue to assaults like fractures or implant placement. This knowledge will help them anticipate and address any potential risks or difficulties that may arise throughout the entire process. In addition, it is important for them to have knowledge in effectively caring for patients who have underlying conditions, particularly those with endocrine disorders.^{1,2}

Thyroid disorders have a higher prevalence among women and rank as the second most common



endocrine disease, impacting approximately 1% of the general population. Thyroid disorders and thyroid hormone medications can have an impact on bone metabolism. Research on bone mineral density (BMD) changes in patients with hypothyroidism has produced conflicting findings. Some studies suggest that T4 replacement therapy leads to a notable decrease in BMD in different skeletal areas, while others have not been able to confirm these results.^{3,4}

Using dental implants in the maxillary posterior region to replace missing teeth is a practical treatment choice. Fixed dental implant-supported prosthetics offer numerous advantages compared to traditional crown and bridge or removable tooth-borne prosthetics. There are several benefits to using dental implants, such as preserving the remaining bone, making oral hygiene easier, increasing the lifespan of the implant, and not affecting the neighboring teeth.^{5,6}

Pre-implantation sinus augmentation is necessary for achieving successful and predictable dental implant therapy to replace the upper molar teeth. In the past, if the residual alveolar bone height was less than 6 mm, maxillary sinus augmentation would be necessary. This surgical procedure involves increasing the vertical height of the alveolar bone, which is then followed by the placement of a dental implant. There are various surgical approaches and biomaterials utilized for this procedure. This procedure was performed using the lateral window technique, which required a larger surgical incision and complex bone augmentation procedures.^{7,8}

On the other hand, the traditional surgical method frequently leads to various complications such as slow wound healing, sinus infections, and a high rate of failure in bone augmentation. Many oral surgeons have been applying a minimally invasive technique to lift or augment the maxillary sinus. One of the most frequently employed surgical techniques to enhance the maxillary sinus is bone grafting, which involves the use of either natural or synthetic bone materials.⁹ The purpose of this case report is to demonstrate a less invasive approach for augmenting the maxillary sinus

in order to replace the first molar tooth. In addition, the current technique shows great promise for cases with a low residual bone height.

Case Report

A 61-year-old male non-smoker, who was in good health and did not grind his teeth, came to the dental clinics because he had lost his upper left and right 1st molars. These molars were removed a few years ago because of a periodontal issue. The patient mentioned having hypothyroidism and was prescribed thyroxine (100 mg daily). In addition, she mentioned that there were no notable family, genetic, psychological, or social factors to consider. The patient had a BMI of 30 and no other medical conditions. Clinical observation revealed the presence of sufficient keratinized gingiva in the #16 area. The OPG x-ray revealed significant vertical bone loss, with a residual bone height measuring less than 6 mm on average.

During the intraoral examination, it was observed that the oral hygiene was in good condition. (Figure 1 and 2) The occlusion appeared to be normal, with a 3 mm anterior overbite and a 2 mm and 3 mm posterior right and left overbite, respectively. (Figure 3) In addition, the anterior overjet and posterior overjet measure 2 mm, indicating a balanced jaw relationship. The articulation of the mandible on both sides functioned as a group. There is no early contact in occlusion.

During a thorough intra oral examination, it was observed that there is a missing tooth in the 16 region. The patient's overall periodontal health was in good condition, even though they did not regularly seek professional oral hygiene and had pocket depths of less than 3mm in all teeth. After a thorough discussion of the advantages and disadvantages of each treatment option, the patient and I reached a consensus on the placement of an implant in the missing area. Prior to the surgery, the treatment plan was thoroughly discussed with the patient.

As a health educator, it was important for the patient to sign an informed consent form. Prior to the surgical procedure, the patient was instructed to rinse their



mouth with 0.12% chlorhexidine mouthwash for a duration of 3 minutes, repeating this process three times. Next, local anesthesia was administered with 1:100000 adrenaline. The flap was raised using mid crestal and crevicular incisions. The osteotomy began with the pilot drill, rotating in a clockwise direction and stopping 1 mm before reaching the sinus floor. Next, the orientation of the osteotomy in relation to the adjacent teeth was assessed by inserting a paralleling pin on a radiovisiograph (RVG). After that, a 2.5 mm Densah™ bur (Jackson, MI: Versah, LLC) was carefully inserted 1 mm below the sinus floor, rotating at a speed of 800 rpm in a counterclockwise direction. The sequential widening procedure involved using drill bits of different sizes (3 mm, 3.5 mm, and 4 mm) and switching the drill motor to reverse-densifying mode. This was done with a gentle pumping motion, following the instructions provided by the manufacturer. Vertical depth and membrane lift were increased during the process, with adjustments made in 1.0 mm increments. A brief pause and release of pressure on the bone, with regular flushing using saline solution, was maintained throughout the procedure. The final 4.5 mm drill was inserted to a

shallower depth in the osteotomy to ensure primary stability. A radiographic image taken immediately revealed a 4 mm elevation, allowing for the easy placement of a 5 mm × 10 mm implant. (Figure 4 and 5) Implant stability was successfully achieved, with an average initial torque measurement of 40 N-cm. The clinical examination revealed no indications of bone dehiscence on the buccal or lingual sides, and the patient underwent the procedure without any issues. It was advised to the patient to avoid eating or chewing on the operated side for the initial 12 weeks following the surgery. The patient was monitored for a duration of 6 months. Currently, radiographs are used to assess the progress of healing. The X-ray and clinical evaluation showed a satisfactory level of bone-implant healing. Therefore, the implant became visible after the flap was lifted using a crestal incision. The cover screw was taken out and the healing abutment was securely fastened onto the implant. Afterwards, the flap was carefully stitched back in place. Following a 20-day period, the next step involves scheduling the placement of the final abutment and temporary crown. (Figure 6 and 7)

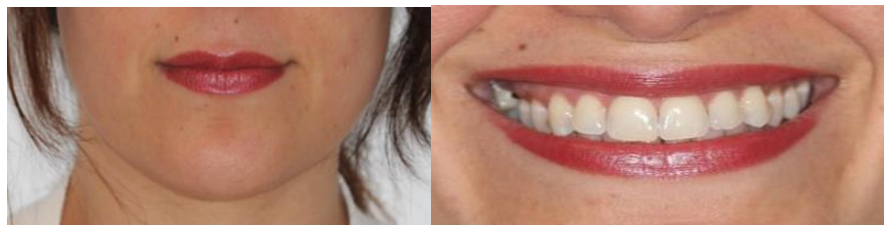


Figure 1: Extra Oral Photographs



Figure 2: Intraoral Examination



Figure 3: Occlusal Evaluation – Static

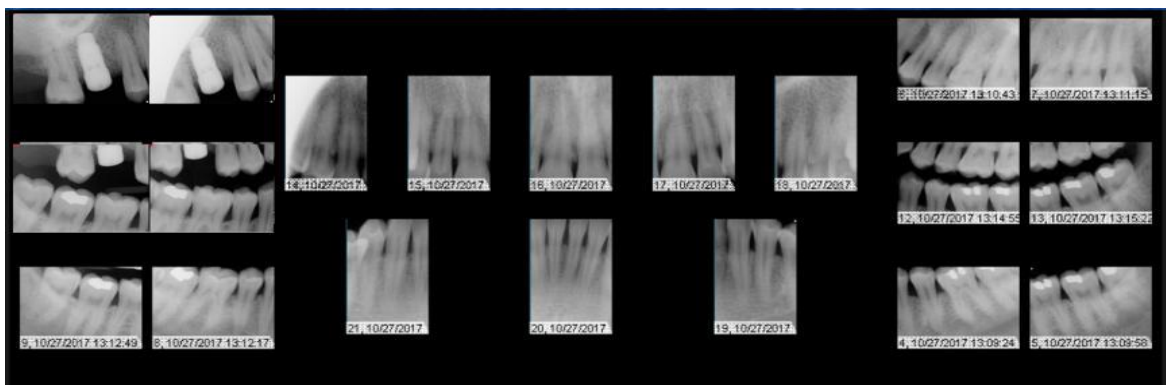


Figure 4: Various Radiographs



Figure 5: X ray showing healing abutment and good bone level around implant



Figure 6: Healing abutment placement with good gingival healing around implant



During this period, the progress of the osseointegration process is assessed. If additional time is required, the placement of the final abutment and temporary crown will be delayed. When placing the abutment, it's crucial to securely hold it while tightening the screw. By implementing this approach, rotational forces are avoided from being directly exerted on the interface between the implant and the bone. The patient avoids placing any pressure on the temporary crown for a period of 3 months. When no symptoms are present, the patient is directed to the restorative for the final restoration.

Following a 3-month period of temporization, the upper arch was prepared for an impression, along with a wax-bite registration, using standard procedures for implant level impression techniques. The prosthetic restoration successfully addressed the primary concern of ensuring proper occlusion, margins, and embrasures throughout the fabrication process. After two weeks, a zirconium-ceramic crown was applied and adjustments were made during the same visit. The final results were extremely pleasing. The bone height remained stable during the six-month and one-year follow-up. (Fig 3)



Figure 7: Post operative tooth placement over implants

Periodontal Charting: Maxilla

Probing Depth	3	2	3	3	3	2	3	2	2	3	2	2	2	2	2	1	1	2	1	2	2	1	2	2	2	1	2	3	2	2	3	2	3	3	2	3	
Recession																																					
Attachment level	3	2	3	3	3	2	3	3	2	3	2	2	2	2	2	1	1	2	1	2	2	1	2	2	2	2	2	3	3	2	3	2	2	3	2	3	
Masticatory Mucosa																																					
Plaque	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Buccal																																					
Lingual	UR8	UR7	UR6	UR5	UR4	UR3	UR2	UR1	UL1	UL2	UL3	UL4	UL5	UL6	UL7	UL8																					
Plaque	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Attachment level	3	3	3	3	2	2	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	3	2	3	3	2	3	3	3	3	2	3	
Recession																																					
Probing Depth	3	2	3	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	3	2	3	3	2	3	3	2	3	



Periodontal Charting: Mandible

Probing Depth	4	3	4	3	3	3	3	3	2	2	3	2	2	2	2	2	2	2	1	2	2	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3					
Recession																																																				
Attachment level	4	3	4	3	3	3	3	3	2	2	3	2	2	2	2	2	2	2	1	2	2	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3			
Masticatory Mucosa	3			3				4				4						5					5													4							4				5		5			
Plaque	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Lingual	LR8	LR7	LR6	LR5	LR4	LR3	LR2	LR1	LL1	LL2	LL3	LL4	LL5	LL6	LL7	LL8																																				
Buccal																																																				
Plaque	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Masticatory Mucosa	3			3					2				2				3				4				4				3				3			2			2			3			3			3		3		
Attachment level	3	2	3	3	3	3	3	2	2	2	2	2	2	2	2	1	2	2	1	1	1	1	2	2	2	2	2	1	2	2	1	2	2	1	2	3	3	2	2	3	2	3	2	3	2	3	2	3	2	3		
Recession				1			0		1			1																																						0	0	0
Probing Depth	3	2	3	3	2	3	3	2	3	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	2	2	2	2	1	2	2	1	2	3	2	2	2	2	2	2	2	3	2	3	2	3	2	3			

Discussion

Thyroid disorders are quite prevalent, with about 1% of the general population being affected, and they tend to be more common in women. The connection between thyroid diseases and bone metabolism was initially documented a century ago. Hypothyroidism has a significant impact on the recruitment, maturation, and activity of bone cells, resulting in a decrease in both bone resorption and formation. The criteria for successful dental implants in hypothyroidism have been extensively investigated in the literature and continue to be a topic of debate among researchers. In 2001, the success of implant osseointegration was evaluated during the 2nd stage of surgery and annually thereafter using clinical and periapical radiography to measure marginal bone loss. In a 2002 analysis conducted by Elsubeihi et al¹⁰, the main factor for implant success was identified as the marginal bone. However, the specific method of analysis was not mentioned in the study.¹¹

This case report presents a modified surgical approach for maxillary sinus augmentation, aiming to achieve the necessary bone height for successful dental implant placement and restoration. The six-month and one-year follow-ups showed significant progress in the healing of the maxillary sinus. The dental implant restoration is in a stable and successful condition. In the event that membrane perforation is observed

during this procedure, it is important to address the issue promptly. During the procedure, no perforation was monitored in our case. There were no complications following the surgery. An increase in the bone formation around the implant was observed in the follow-up X-ray.

Having a good grasp of the anatomical variations of the maxillary sinus is crucial for the success of surgical lifting procedures and augmentation. It is important to consider the integrity of the Schneiderian membrane during the surgical procedure. Through careful consideration of these factors, Aghaloo et al conducted a comprehensive review and discovered that dental implants in the augmented sinus floor augmentation exhibited impressive survival rates of 91.5%.¹²

Using dental implants offers several benefits, including the preservation of remaining bone, simplified oral hygiene, extended lifespan, and minimal impact on neighboring teeth. To ensure a successful and aesthetically pleasing dental implant treatment, it is crucial to meet specific clinical parameters. For a successful implant treatment to replace missing teeth in the posterior maxilla, careful preoperative planning and a well-defined surgical plan are essential. The prostheses are then custom-made, taking into account both function and the support provided by the surrounding soft tissues. It is important to take into account the desired prosthetic



outcome when planning treatment, in order to customize implant surgery and achieve the intended goals. If the final position of the prosthesis is not visualized before surgery, it may not be possible to achieve the desired end result with the placement of dental implants.^{13,14}

Conclusion

In this case reports, dental implants were successfully placed in patients with hypothyroidism, meeting all the necessary criteria for successful implantation. Additional documentation is necessary in various clinical scenarios to validate or refute the findings in this report. This case report highlights the benefits of minimally invasive surgical procedures for sinus lifting, which result in fewer postoperative complications compared to lateral approach techniques. And it showed encouraging short and long-term clinical outcomes.

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