



Case Report

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A Case Report: Custom Designed in Atrophic Maxilla

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Abstract

Curved implants, bone graft and traditional endosseous implants, zygomatic implants and subperiosteal implants are used for the treatment of edentulous patients with maxillary bone atrophy. The purpose of this case report is to set an example for the use of the subperiosteal implant technique to design a new smile for the patient by saving him from the functional, physical and psychological discomfort caused by maxillary atrophy. The patient is a 48 year old woman with no systemic disease and no medication. Alcohol and smoking are also not present. 2 months ago, the patient underwent vestibular deepening along the entire arch. Subperiosteal implants were placed first in the left and then in the right maxilla, from posterior to anterior, from the zygoma to the palatine. Afterwards, the screws were tightened and fixed and a cap was placed over the implants. The flaps in the buccal and palatal regions were freed. A modified matrix suture was placed around the caps so that no bone and no subperiosteal implant section was exposed. The patient was discharged after the appropriate medical treatment was provided. The complete safety of this minimally invasive fixation technique of subperiosteal implants in the atrophic maxilla has not yet been proven and further clinical studies are needed.

Keywords: Dental Implantation, Subperiosteal, Dentistry, Oral surgery.

INTRODUCTION

Dental implants are considered the gold standard in oral and maxillofacial implantology. Short implants, all-on-four and all-on-six implants, and other augmentation techniques are utilized by expert. Assessing the sufficiency of dentoalveolar bone is necessary for dental implant procedures. When there is inadequate bone support, several procedures such as bone augmentations, sinus lifting operations, short implant applications, split augmentation operations, all-on-four, all-on-six, and zygomatic implants are considered. Various types of implants, including inclined, bone graft, traditional endosseous, zygomatic, and subperiosteal implants, are utilized to treat patients with severe maxillary bone loss due to prolonged tooth loss [1,2]. Subperiosteal implants were developed in Sweden in the early 1940s and are custom-made fixtures stabilized by screws placed under the periosteum and the mucosal tissue covering them [3]. Subperiosteal implants have been produced from chrome cobalt alloy since 1940 [4]. The subperiosteal approach has gained popularity among patients and physicians due to advancements in dental volumetric tomography, laser sintering technology, artificial intelligence technology, and digital prosthetic rehabilitation methods in dentistry. AMSII is custom-designed for the patient using their Dicom data on software. It does not need additional bone augmentation, and chewing forces may be digitally estimated by finite element analysis. Subperiosteal implant is a procedure used for patients who require advanced therapy, suffer from maxillary atrophy, and are unable to manage this condition. Dentures become more unstable due to a decrease of bone support. Chewing difficulties can influence dietary choices by affecting eating habits. Denture wearers frequently experience impaired oral mucosa. This may result in mucositis or stomatitis and different levels of soft tissue alterations. The anatomical points used as a guide in this case, three different anatomical areas should be defined to examine the edentulous or partially edentulous maxilla. The anterior part, called the premaxilla, has two halves that meet at the midline, and therefore the intermaxillary suture lies below the piriform. It extends bilaterally to the surface of the canine dorsum and includes the midline symphysis, the alveolar processes of the central and lateral incisors, and the associated palatal process. Along the remaining alveolar crest is the midmaxilla, the adjacent part of the maxillary bone. The maxilla contains the canine ridge to the anterior border of the antral part of the maxillary sinus, and this maxillary part contains the canine and the bony volume of the two premolar teeth. The area distally along the remaining crest is the posterior maxilla. Distally, in the tuber maxilla part, there is the articulation of the sphenoid to the pterygoid process, while in the palatal region, the pyramidal process and the palatal bone are seen. The purpose of this case report is to set an example for the use of the subperiosteal implant

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technique to design a new smile for the patient by saving him from the functional, physical and psychological discomfort caused by maxillary atrophy.

CASE REPORT

The 48-year-old female patient is free from any systemic disease and is not using any medication. She avoids from alcohol and does not have insurance. The patient underwent gallbladder surgery 5 years ago, resulting in the removal of his bile. The patient had vestibule deepening surgery throughout the entire arch 2 months ago. The patient was prescribed Augmentin BID 1000 mg prophylactically before the operation. (Figure 1) The surgery began with tuber, infraorbital, and palatinus majus block anesthesia on both sides, supplemented by an infiltrative anesthetic. 6 ampoules of Ultracain DS-Forte were utilized in total. The procedure began in the left maxillary region with a precise incision done conservatively. A full-thickness flap was then opened 2 mm distant from the palatal instead of the crest to protect the keratinized gingiva. After a full-thickness flap was opened from both the buccal and palatal regions and the infraorbital canal was seen, the buccal flap was fixed to the cheek bilaterally, and the right and left arch palatal flaps were fixed to each other, and a retraction flap was applied, and the view of the surgery area was sharpened. It has been made suitable for the placement of guides specially prepared for the patient. (Figure 2) After the guides were placed from posterior to anterior, the screw slots were opened and fixed with special screws in each region, and the appropriate osteotomies were made through the guides to ensure the regularity of the bone cavity. The guides were removed after the osteotomies were made. Subperiosteal implants were placed first in the left and then in the right maxilla, extending from posterior to anterior, zygoma, and palatal. Subperiosteal implants placed in the zygoma, vomer and palatal regions were fixed with screws. (Figure 3) Our preference for screws applied in a specific width and length for each patient is self-drilling screws. The feature of these screws is that they advance by expanding the bone itself. In order to prevent the screws from creating stress on the bone, the process of fixing the guide, which started with a contra-angle handpiece, was continued with the screws moving back and forth with the ratchet. After placing first the left and then the right arch subperiosteal implants, the screws were tightened and fixed for the last time and caps were placed on the implants. Retraction flaps in the buccal and palatal regions were released. Modified matres sutures were placed around the caps so that no bones or skeleton were left exposed. Tekmon was used as suture. It is preferable to use rapid vicrl and/or rapid PGA. (Figure 4) In addition to the broad-spectrum antibiotic prescribed to the patient as a prophylactic antibiotic, narrow-spectrum antibiotics; Cefax 500 mg one box twice a day for 7 days, Dikloron 75 mg 1 ampoule IM twice a day, Dekort 8 mg IM 3 ampoules once a day to be applied for 3 days, Andorex spray 4 times a day starting 24 hours after the surgery. Aftamed gel has been prescribed to be applied to the area 4 times a day. The patient was kept under observation for a while and was discharged.



Figure 1: Three-dimensional modeling

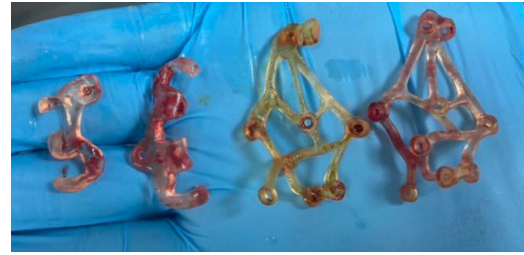


Figure 2: Custom-made guide for the patient



Figure 3: Subperiosteal implants placed in the zygoma, vomer and palatal regions fixing with screws



Figure 4: Placement of implants and application of the tekmon suture

When the patient is followed after surgery; No opening was observed in the wound area. Our patient's oral hygiene was good. A VAS scale was used for pain/temperature/soreness and the patient gave a value of 8 out of 10. The patient was followed for 4 weeks and the consistency and color of the attached gingiva were examined. The end of gingival contraction was determined. Secondary infection was not observed and fixed prosthetic treatment was started and a hybrid fixed occlusal screw prosthesis was applied.

DISCUSSION

According to long-term follow-up of subperiosteal implants in the treatment of total and partial edentulism, the survival rate of subperiosteal implants during the entire observation period (5-17 years) is 96% [5]. In their study on maxillary subperiosteal implantitis, Takaoka et al. found that the patient's symptoms were relieved by removing the defective implant [6]. Maxillary sinus perforation, severe sinusitis and bone resorption are the most common subperiosteal implant complications.

In addition, it is more difficult to design a subperiosteal implant based on cancellous bone instead of cortical bone, that is, to design a subperiosteal implant based on the maxillary arch instead of the mandibular arch, the primary reason for this is morphology [7].

3D finite element analysis is a numerical stress analysis technique widely used to study engineering and biomechanical problems. Its combination with new manufacturing techniques such as additive manufacturing provides significant improvements in the design and performance of implants compared to more traditional approaches [8].

Cone beam computed tomography (CBCT) produces three-dimensional reconstructions of maxillary anatomical structures using a single scan

and offers multiple views with low radiation [9]. CBCT scanning allows assessment of the quality and quantity of remaining bone, which is crucial for interactive implant planning at any site.

Cone beam computed tomography (CBCT) studies have revolutionized craniofacial imaging and helped understand the anatomical and morphometric variability in the edentulous maxilla in our case.

CONCLUSION

When teeth are missing, bone resorption occurs, leading to an aged appearance in the mirror, deterioration of the smile, difficulty in chewing, and a loss in quality of life. Instead of consistently suggesting conventional surgical methods, it is important to consider the unique aspects of each case and select the surgical technique depending on the specific situation at hand. The complete safety of this minimally invasive fixation method for subperiosteal implants in the atrophic maxilla has not been definitively established, and additional clinical research is required.

Conflicts of Interest

The author reports no conflicts of interest.

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