



Case Report

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Bilateral sinus augmentation using Hydrodynamics for Functional and Esthetic maxillary rehabilitation

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Abstract

Edentulism is a prevalent oral health issue that negatively impacts the quality of life of the patient on a social and psychological level. For the treatment of edentulism, implant-supported prosthesis replacement is the most successful and supported treatment plan. Placement of an implant in the maxillary arch exposes a clinician to various complications like the quality of bone, pneumatization of the maxillary sinus, atrophic ridge, etc. This issue can be addressed with bone augmentation techniques using various bone graft materials which can improve the quality of bone and can also protect the sinus membrane. Current concepts in implant dentistry rely on techniques that are minimally invasive. Elevation of the sinus membrane can be performed by a minimally invasive procedure with the help of DASK kits. This case report discusses the full mouth maxillary rehabilitation with immediate implant placement after extraction of hopeless teeth in the anterior region followed by bone augmentation, indirect sinus lift and delayed implant placement in the maxillary molar region using a hydraulic sinus lift DASK kit. The patient has been reviewed periodically and the maxillary arch was later restored using a malo-bridge.

Keywords: Sinus lift, Lateral sinus lift, Sinus augmentation, DASK, Malo bridge.

INTRODUCTION

Edentulousness in the aesthetic region of the teeth, with or without phonetic impairment, is a traumatic event. Full-arch, fixed, and detachable implant-retained prostheses have been the subject of numerous reports in the literature ^[1,2]. Many practitioners use the term "full-arch rehabilitation," which has gained popularity as a restorative alternative for dental settings prostheses. The entire rehabilitation of edentulous jaws is a significant problem since the radiographic data of bone availability is heavily relied on for appropriate implant planning for an accurate approach to prostheses. Thus, implant-supported single-tooth replacement is currently the most difficult circumstance troubling a doctor. For patients with missing teeth, an established treatment option is an implant-supported fixed replacement. Implant placement and loading techniques are ever-changing.

In order to prevent the issues linked to the delay between extraction and implant placement, immediate implantation has garnered attention. More frequently, especially in the maxillary cosmetic region, failing teeth are removed and replaced with implants. Sometimes, this is followed by quick provisionalization ^[3]. The loss of anterior and molar teeth may be successfully treated with immediate implant insertion ^[4]. In addition to shortening the time and reducing the number of procedures, other benefits have been highlighted, such as increased implant survival rates, improved aesthetics, higher patient satisfaction compared to delayed implants, and avoidance of excessive resorption that would otherwise occur after extraction ^[5]. In order to report a case of full-arch maxillary rehabilitation with seven endosseous implants loaded right away after the normal treatment, this study is being done.

Due to sinus pneumatization, alveolar bone shrinkage, or trauma, implant placement in the posterior edentulous maxilla is frequently difficult. The most common surgical method to enhance the vertical bone

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height of an atrophic posterior maxilla in order to prepare for dental implant insertion is the maxillary sinus lift elevation operation with bone graft augmentation [6]. By performing minimal augmentative and implant surgeries and using the possibilities and advantages of classic prosthetic dentistry, the clinical situation described here has been managed and the atrophic maxilla was rehabilitated.

CASE REPORT

A 58-year-old male patient reported to the outpatient department of Periodontology and Implantology with a chief complaint of bleeding gums on his teeth for the past 4 weeks. His medical history revealed that he is a known diabetic and hypertensive for the past 10 years and is under medications. He had no history of allergies.

On oral examination, it was found that the patient was wearing an ill-fitting single-unit cantilever FPD replacing the maxillary teeth. The mandibular teeth were endodontically treated and he had an FPD in the mandibular arch except in 48 and 37. Thereafter, a full mouth periodontal examination was carried out with a UNC 15 probe which revealed 7-8mm of PPD, with grade III mobility resulting in stage IV grade III periodontitis in the maxillary arch.

Based on the above clinical findings a panoramic radiograph was taken. The radiograph revealed that there was generalized bone loss around the maxillary and mandibular teeth. Also, there was an extensive bone loss in the maxillary arch in which the floor of the sinus was very close to the crest in the posterior edentulous areas. To evaluate the bone assessment in detail in the maxillary arch, the patient was advised for CBCT. On CBCT evaluation, it revealed deficient buccal bone in relation to the upper right and left the posterior region.

The patient was informed about various treatment modalities. Since the patient was very conscious about his appearance, he was suggested the treatment plan of fixed implant prosthesis with immediate loading as a replacement option. Based on the CBCT findings, maxillary rehabilitation was planned using 7 dental implants. Of the 7 implants, 5 were planned for immediate implant placement in the anterior region followed by the extraction of all teeth, and 2 implants were planned as delayed implant placement. Out of the five implants, 3 implants were planned for placement in the anterior region and 2 were placed in the premolar region without sinus augmentation on either side. The other 2 implants were placed with sinus augmentation bilaterally due to a deficient labial bone plate.

In the initial visit, Oral Prophylaxis was performed to eliminate the infection. Thereafter, under local anesthesia with 2% lignocaine (1:80,000 conc.), atraumatic extraction of all hopeless teeth in the maxillary arch was performed using periosteal elevator. The extracted sockets were evaluated for any osseous defects and granulation tissue was thoroughly debrided with curettes and saline irrigation was done. The apical extent of the extracted sockets was evaluated for hard tissue integrity. Sequential drilling with copious irrigation was performed and five implants were placed in the osteotomy sites mentioned accordingly with the appropriate dimensions on the same day of the surgery. Five implants were planned of which three were in the anterior region and then two implants were selected to place in the premolar regions respectively. The remaining two implants are to be placed in the molar regions followed by the temporary acrylic implant-supported denture.

As mentioned in the treatment plan, Due to the deficient labial bony plate in the 12,13,14 regions implant was not placed and the socket was filled with sticky bone which combines the bone graft (BIO-OSS) full details and the mixture of I-PRF. Sutures mention 3-0 vicryl implant abutment and post-surgical instruction medication. The patient was recalled and evaluated for healing.

A closed tray impression was made using the rubber base impression putty (Aquasil, DENTSPLY Caulk, Milford, DE, USA) in the maxillary arch and with alginate in the mandibular arch. Then, the temporary implant-supported denture was cemented with Glass Ionomer luting cement on the abutment after two days of implant placement. The immediate loading protocol was carried out due to the achievement of more than 35 N/cm torque hand wrench. The patient was pleased with the immediate temporization of the temporary crowns which was aesthetically good and also functional. The patient recalled an uneventful healing period on his recall visit after 2 weeks.

In the recall visit, the placement of the delayed implant following the sinus augmentation was performed in regions 17 and 27.

Transcrestal sinus floor elevation was performed by the Dentium Advanced Sinus Kit (DASK) drills from Dentium Corporation (Cypress, CA, USA) was done in 17, 27. After the preparation of the implant bed by the twist drills, the residual cortical bone was elevated or grinded by the DASK #1 and #2 drills gently with minimum pressure. Then, the sinus membrane was separated and elevated by the #3 drill. With the internal irrigation, the elevation procedure was assisted by the water pressure, and the membrane was elevated with enough height using the hand elevators by DASK, the bone graft (BIO-OSS) was filled into the cavity and the implant was placed. The patient was then asked to perform the Valsalva maneuver prior to the bone grafting to test for any membrane perforation.

All patients were examined two weeks postoperatively, then after 6 months postoperatively. The clinical parameters of importance for the determination of implant success included: Absence of pain, tenderness, discomfort, wound dehiscence, implant mobility or any other complications related to the sinus lifting or implant placement.



Figure 1: Pre operative panoramic radiograph





Figure 2: Preoperative clinical photograph (A,B,C)



Figure 3: Bone Graft (Bio-oss)



Figure 4: Post operative clinical photograph (A,B)



Figure 5: Post operative panoramic radiograph

DISCUSSION

Immediate implant insertion at post-extraction sites after a single surgery has good success rates, ranging from 92.7% to 98% [7]. When compared to conventional procedures, where complete healing is anticipated in post-extraction locations, a meta-analysis demonstrates that patients had higher levels of satisfaction with placement approaches for post-extraction implants [8]. Improved aesthetic outcomes are assured because the alveolar bone is retained. Post-extraction implants shorten the length of the healing process and are physiologically and functionally effective. The rehabilitation of a full maxillary arch using fixed implant-supported restorations with instantaneous implant placement and immediate loading technique is described in this clinical report. Primary implant stability continues to be a crucial need for implant success in both post-extraction and delayed techniques [9]. Biological stability increasingly replaces primary mechanical stability during the osseointegration process.

The effects of extraction are well known: a resorption rate of 0.5% to 1% per year for the remainder of the patient's life and an alveolar bone loss of 40% to 60% in the first 2 to 3 years [10]. Alveolar bone loss in height and width is prevented by replacing the missing root right away. Immediate insertion typically needs bone augmentation due to the geometric mismatch between the extraction socket and implant design. Larger diameter implants have been suggested as a solution to this difference, possibly in conjunction with directed bone regeneration [11].

Maxillary sinus augmentation procedures are increasingly performed by oral and maxillofacial surgeons, periodontists, dentists, and otorhinolaryngologists worldwide. Prevention and management of the associated complications principally begin with having a thorough knowledge of the sinus augmentation techniques. The osteotome technique is an alternative and conservative technique for sinus floor augmentation and immediate implant placement in the posterior region of the upper jaw. According to the relative literature, the osteotome technique appears to be a predictable and safe method for augmenting bone at the sinus floor and improving bone density and quality of the

implant site ^[12]. Conventional techniques possess the morbidities such as infection of the graft, acute sinusitis, flap dehiscence, over-filling necrosis, loss of graft material, formation of oroantral fistula, migration of dental implants into the sinus cavity, implant failure, cyst formation, and BPPV are among the postoperative complications specific to external sinus lift procedure, along with edema, hematoma, minor nosebleed, and mild congestion.

The hydraulic sinus lift technique was first proposed by Andreasi Bassi and Lopez who suggested the use of hydraulic pressure exercised on a graft material of a paste-like consistency to detach the antral mucosa and simultaneously fill the subantral space thereby creating ^[13]. This technique, when combined with immediate loading implants in the rehabilitation of the maxillary arch, is clearly superior to any other techniques and the patient's satisfaction appears to be extremely high since the morbidities associated with conventional sinus lift techniques are bypassed.

The dental implant, deproteinized heterologous bone, and autologous bone acquired during alveolus preparation are typically used to fill the alveolar socket. Some patients seek a rehabilitation capable of yielding the best aesthetic outcome possible despite the cost, whereas others request a rehabilitation capable of affording a satisfactory aesthetic result at a lower cost ^[14]. In cases such as the one reported here, we present a simplified technique of maxillary arch rehabilitation with immediate loading implant, which gives the patient complete satisfaction, and improved quality of life which significantly reduces the number of implant components and materials involved, and consequently the cost of treatment, while maintaining acceptable aesthetic and functional outcomes.

CONCLUSION

Complete maxillary rehabilitation using an immediate implant placement may be a highly technique-sensitive procedure. In this case, our patient met all the indications for immediate implant placement. Using the hydraulic sinus lift technique, we were able to provide the patient with a desirable aesthetic and functional outcome with good satisfaction. However, careful case selection and treatment planning usually result in success rates, especially in full arch rehabilitation.

Acknowledgment

The patient signed written consent form to allow his case to be published.

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