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# Surgical Optimization of a Compromised Defect in the Esthetic Zone: A Case Report

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**Abstract** Restoration of function and esthetic in anterior region of mouth exhibits great challenges to clinicians. Placement of implant in esthetic zone requires extremely careful planning of various phases of treatment to maximize the results. In this case, we demonstrated in detail step by step approach of using autogenous block graft which is also considered as gold standard of augmentation of bone at defective site. Soft and hard tissue augmentation, ideal implant positioning and perfect temporization are hallmarks of achieving maximally desirable esthetics and restoration of normal functioning of occlusion.

***Keywords:*** *bone grafting, dental implant, osseointegration*

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## 1. Introduction

Today, implant-supported restorations often represent the best solution, because intact tooth structure and supporting tissues can be preserved Implant in esthetic zone is one of most challenging procedure. Rehabilitation remains a challenge due to the complexities of maintaining an adequate framework of hard and soft tissue architecture, which is ultimately required for the restorative phase of treatment [1]. According to SAC classification of implant site in 1999 by Swiss Society of Oral Implantology: All implants in esthetic area are placed in A and C category [1]. The most predictable hard tissue graft is autogenous graft. The mandible is a common source of autogenous block bone grafts the chin and ramus are the most donor sites for block for both horizontal and vertical bone grafting [2,3].

This case report presents a step by step surgical procedure in a case where a hopeless tooth # 21 was restored after extraction by both soft and hard tissue augmentation using acellular dermal matrix and autogenous block graft, then an implant was placed and a crown was fabricated.

## 2. Surgical Procedures

A 24-year-old patient reported to periodontics Department, ~~at~~ King Abdulaziz University College of Dentistry complaining of recession and pus discharge from the upper left incisor (Figure 1, Figure 2). After clinical, radiographic and periodontal examination the tooth #21 was diagnosed with endo-perio lesion with fistula opining in buccal mucosa in addition to severe buccal bone resorption and recession, The patient also demonstrated anterior open bite. Orthodontic treatment option was not accepted by the patient so a surgical approach was offered.

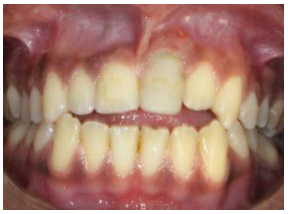

**Figure 1**. Steps followed during procedure

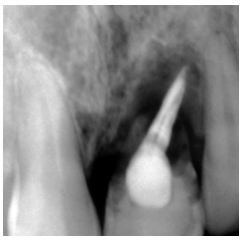

**Figure 2**. Steps followed during procedure

### 2.1. Soft Tissue Augmentation

Under local anesthesia (2% lignocaine hydrochloride with epinephrine 1:200,000) the hopeless tooth #21 was extracted and a temporary partial denture was provided. For soft tissue augmentation, two vertical incisions were made, mesial and distal to the area to be augmented. A tunnel was done under the mucosa using periosteal elevator extending mesial and distal of the tooth #21. Acellular dermal matrix (ADM) is then inserted through the tunnel and positioned over the recipient site using

periosteal elevator, and is fixed coronally by suspension sutures. (Figure 3)

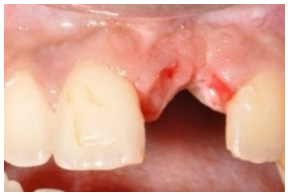

**Figure 3**. Steps followed during procedure

## 2.2. Hard Tissue Augmentation

A full-thickness mucoperiosteal flap was elevated from the distal of 13 to the distal of the 23. Decortication of the buccal plate of bone at the defect site was performed to enhance guided bone regeneration at the recipient site. The symphysis area was used as donor site to obtain the block graft. After administration of local anesthesia, inferior alveolar nerve block on both sides a sulcular incision was made extending from the mesial of the 33 to the mesial of the 43. Two vertical incisions were made extending from the buccal line angles of both canines and to the depth of the buccal vestibule. A full- thickness mucoperiosteal flap was reflected, and a tailored tin foil surgical template was placed at the donor site (Figure 4, Figure 5).

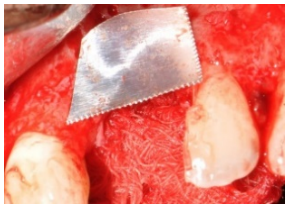

**Figure 4**. Steps followed during procedure

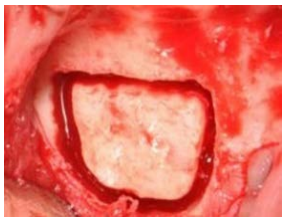

**Figure 5**. Steps followed during procedure

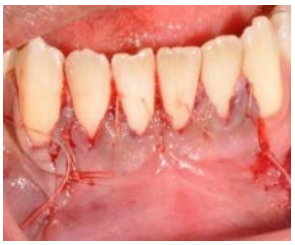

**Figure 6**. Steps followed during procedure

The graft size was extended approximately 1 mm beyond the recipient site margins from all directions, to allow for contouring. A tapered fissure high speed bur was used to penetrate the symphysis cortex via a series of holes that outlined the graft. All holes were connected to a depth of at least the full extent of the bur flutes (7 mm), and the graft is harvested using bone spreaders in addition to straight and curved osteotomes. The graft is placed in normal saline till contouring and fixation. The donor site is then filled with Bio-Oss bone graft (Geistlich Pharma, NJ, USA) and was closed using 4-0 Vicryl suture (company name) (Figure 6). The block graft was then perfectly adapted to the maxillary wall of the recipient site without any gap. Fixation of the graft is done with mini-screws (Systhex, Curitiba, Brazil) to stabilize the prepared blocks. To prevent micro movement of the block graft, miniscrews were placed through its central portion. Bio-Oss particle bone was placed around the block to eliminate any gap. Double bio-collagen membrane (Geistlich Pharma, NJ, USA) was placed over the block graft after flap is released to prevent any tension. The flap was sutured with both horizontal mattress (vicryl 4,0) and single interrupted suture (nylon 4,0). A temporary acrylic guard was delivered to prevent any pressure on the surgical site (Figure 7 - Figure 9).

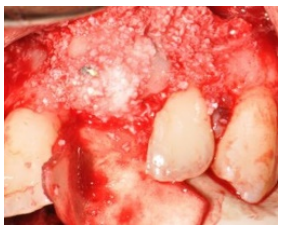

**Figure 7**. Steps followed during procedure

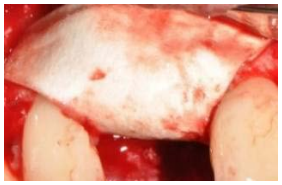

**Figure 8**. Steps followed during procedure

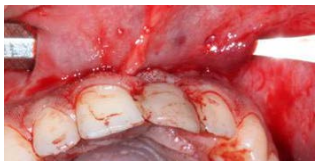

**Figure 9**. Steps followed during procedure

## 2.3. Implant Placement

After 6 months and under local anesthesia a mucoperiosteal flap was elevated to expose the recipient area. The screws stabilizing the graft were removed with a screw holder and a 4.1mm x 11.5 mm implant (lifecore Prima) was placed (Figure 10). Four months after implant insertion periapical radiographs were taken which reviled that osseointegration and bone regeneration took place successfully (Figure 11).

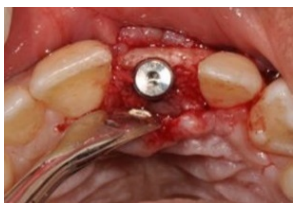

**Figure 10**. Steps followed during procedure

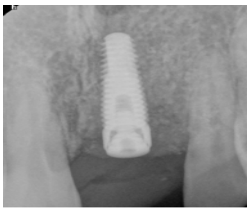

**Figure 11**. Steps followed during procedure

### 2.4. Prosthetic Procedures

During the prosthetic phase a healing abutment was placed to achieve an esthetic soft tissue emergence profile. After stabilization of gingival tissues, implant level impressions were made using open tray impression copings and a master cast was fabricated with implant body analogues. The casts were mounted on an articulator, abutment preparation was done and the implant crowns were manufactured. The porcelain fused to metal crowns were finished and cemented on to the implants using glass ionomer cement (GC Fugi CEM, GC Corporation, Tokyo, Japan) (Figure 12). Finally, a thorough inspection was performed to ensure that the peri-implant sulcus was free of remaining cement particles hence prevent any foreign body reactions.

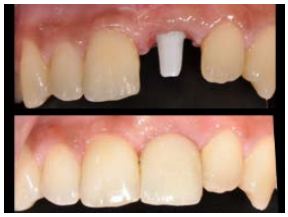

**Figure 12**. Steps followed during procedure

## 3. Discussion

The placement of implants in esthetic zone requires careful planning of surgical and prosthetic phases to achieve the maximum esthetic results. In this case we used the autogenous block graft to augment the defect which is considered the gold standard of bone grafting [4,5,6].

Among the different available augmentation materials, only autologous bone combines osteoconductive, osteoinductive and osteogenic characteristics compared to bone substitutes and composite materials [6]. A 95 % of success have been reported with the use of autologous bone in different resorption defects [7,8]. However, the limitations of autogenous block graft include restricted donor sites and possible post harvesting morbidity. Also, reports of post-surgical unpredictable resorption has been reported for intraoral bone grafts [1,8]. Implant placement in augmented bone with block graft has over all 96.6% success rate with average marginal bone loss of .22mm at 5 years follow up [9].

Prior to block graft placement we performed soft tissue augmentation. Amongst the several surgical procedures to perform soft tissue grafting, we decided in this case to use the tunneling technique for soft tissue preparation prior to the block grafting by using acellular dermal matrix (ADM) to increase the soft tissue thickness prior to block grafting [10].

In a study by Jia-Hui Fu et al., it was reported that a minimum thickness of 1.5 mm is advocated to provide additional protection and coverage to the augmented bone, thus enhancing the final outcome [11]. Alghamdi et al. reported that more complications after block grafts were seen in those patients who did not receive soft tissue augmentation, especially in patients having thin soft tissue biotype [12].

In an attempt to reduce resorption of block graft, we covered it with deproteinized bovine bone graft (Bio-Oss) [13]. Many Studies have reported approximately 7 times greater bone resorption in cases where membrane were not used than those with a barrier membrane placed over the autogenous chin block [14].

Double-layer non-cross-linked collagen membranes has less graft resorption and a higher bone density [15]. In several studies, it was reported that with the use of intraoral block grafts, a gain of 4-7 mm increase in ridge width and a 2-5 mm increase in vertical ridge height was recorded. [16,17] In our study, 5 mm and 3 mm horizontal and vertical bone gain was recorded respectively.

## 4. Conclusion

This case report demonstrated that careful planning, soft and hard tissue augmentation with ideal implant placement, in addition to perfect temporization will result in maximum optimization of both esthetic and functional surgical outcomes.

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