

CASE REPORT

PRESERVE THE RIDGE TO PRESERVE THE SHAPE: A CASE-REPORT

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ABSTRACT

Introduction: Post-Extraction socket preservation using bone graft substitutes is a conservative technique to maintain the width of the alveolar ridge. Xenografts are often considered as bone fillers in socket preservation procedures due to their osteoconductive matrix framework, that enhances new bone formation.

Objective: The objective of treatment in the current case was to preserve the original contour of the bone by limiting the post extraction resorption using xenogenic bone graft substitutes and collagen membrane, followed by placement of implant and prosthetic rehabilitation.

Case details: A 35-year-old male patient with an unrestorable 16 was treated by extraction followed by socket preservation. After 4 months implant placement was done. Prosthetic rehabilitation was carried out 3 months post- implant placement with a 6 month follow up.

Conclusion: The current case demonstrates that grafting of an intact socket using a xenogenic bone graft material with collagen membrane results in an effective preservation of the ridge contour and sufficient new bone formation in the grafted site, which is imperative for a successful implant therapy.

INTRODUCTION

Subsequent to extraction, the socket in the alveolar ridge

often represents a special challenge in everyday practice.¹ The alveolar process is an anatomic structure dependent on tooth², the absence in its alveolus triggers a cascade of biological events that results in a significant local anatomic change that initiates remodelling process resulting in horizontal and vertical reduction of crestal dimensions.³ Bone remodelling processes often cause aesthetic problems and increase the need for bone grafting when dental implants are chosen as the replacement.⁴

The success of implant-supported restorations mostly depends on the interaction between various factors like anatomical, technical, surgical and prosthetic. Restorative-driven implant placement allows the optimal support of the surrounding soft and hard tissues for a satisfactory emergence profile for the final prosthesis.²

The horizontal bone loss/ resorption of the socket is generally more pronounced at the buccal plate, and the vertical resorption is also more evident on the buccal contour of the ridge.

Many surgical solutions are currently available to regenerate an adequate amount of bone in the atrophic crests, including lateral and trans-crestal sinus floor elevation, guided bone regeneration, and block grafting.³

CASE – REPORT

A 35-year-old male patient reported to the Department of Periodontology with the chief complaint of intermittent pain for the past 6months, pain was dull, throbbing, which aggravated at night and upon mastication and relieved on medication. The patient had no relevant medical history. Past dental history revealed uneventful extraction irt 46, 6months back. On clinical examination, gingiva was erythematous, soft and edematous, with rolled out margins, bleeding on probing, in the upper right back tooth region, clinical (Fig.1) and radiographic (Fig.2) examination revealed dental caries involving pulp irt 16 with hyperplastic pulpitis. No Bone loss, or furcation involvement noted. The endodontic opinion was obtained suggesting poor prognosis of 16. A treatment plan of atraumatic extraction with ridge preservation using xenogenic bone graft material and collagen membrane, followed by implant placement 4 months post – operatively, and prosthetic rehabilitation

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Fig. 1: Pre-operative



Fig. 2: Pre-operative radiograph

3-months after implant placement was suggested to the patient.

The patient was subjected to scaling and root planing using a combination of the ultrasonic scaler and Gracey curettes. The patient was provided with oral hygiene instructions and was advised to brush twice daily using the modified Bass technique.

The surgical site was isolated and anesthetized with 2% Lignocaine hydrochloride with adrenaline (1:80000). Using osteotomes, periosteal elevator and extraction forceps, Atraumatic extraction of 16 was carried out (Fig. 3). Care was taken to preserve the wall of the alveolar socket. Intra-sulcular incision from mesial of 15 till distal of 17 was made using #15 B.P. blade and full-thickness flap was elevated. Thorough debridement of the socket was done using bone curettes and the

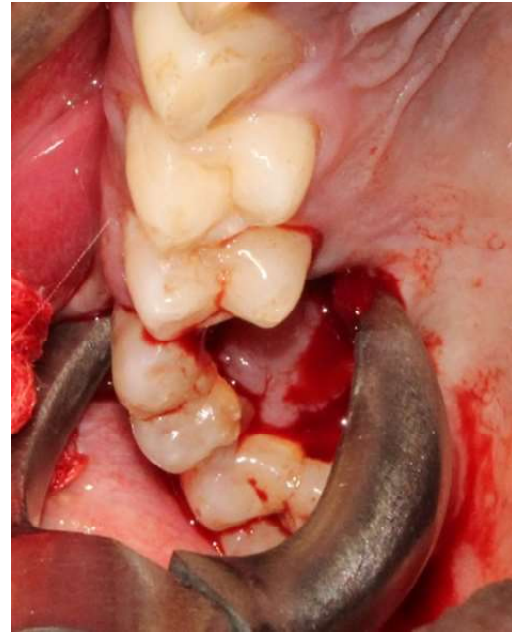


Fig. 3: Atraumatic extraction of 16

socket was irrigated with sterile saline solution (Fig. 5). One end of the Collagen membrane (Cologide®) was placed beneath the buccal flap prior to the placement of bone graft material in the socket. Xenogenic bone graft (Bio-Oss® 0.25mm) material was used to fill the socket (Fig. 6). Graft was placed incrementally from the base of the socket and compressed gently to ensure proper packing of the graft in the socket space without any voids (Fig. 7). Collagen membrane was used as a barrier membrane. Another end of the membrane was inserted beneath the palatal flap, to ensure a viability of the bone was appreciated. 3-0 silk sutures (Mersilk) were used to approximate the buccal and palatal flaps using simple interrupted suturing technique. Patient was recalled after 1 week for suture removal. Healing was found to be satisfactory.

4 months post-operatively, implant placement was planned and performed. The surgical site was isolated and anesthetized with 2% Lignocaine hydrochloride with adrenaline (1:80000). Crestal incision from mesial of 15 till distal of 17 was made using #15 blade and full-thickness flap was elevated buccally and palatally exposing the underlying bone crest. Osteotomy was prepared using the osteotomy drills in the order suggested by the manufacturer. A Noble Bio-care Conical connection 4.3x11.5mm implant was placed at the osteotomy site at 35Ncm and primary stability was achieved (Fig.12-14). The mucoperiosteal flap was repositioned using interrupted silk sutures (4-0 Mersilk) (Fig. 9).

3 months post implant placement, stage II surgery was performed (Fig.16).



Fig. 4: Extracted 16



Fig. 5: Extraction socket

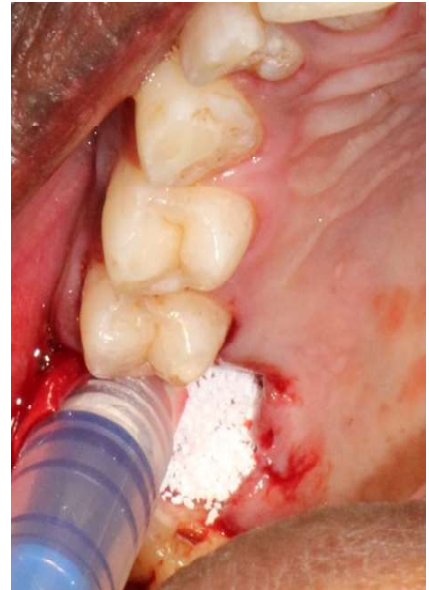


Fig. 6: Placement of Bio-Oss® Pen material after placing Cologide® under the buccal flap



Fig. 7: Placement of Bio-Oss® incrementally and gently compressed to avoid voids

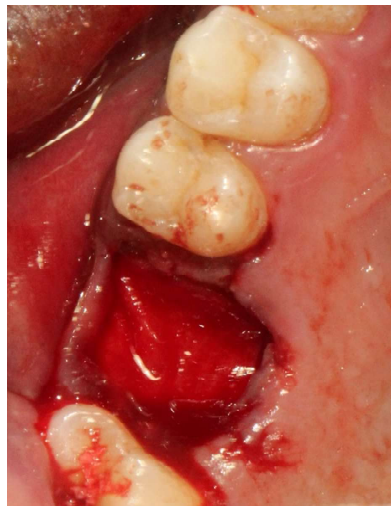


Fig. 8: Free end of Cologide® inserted into palatal flap for complete seal

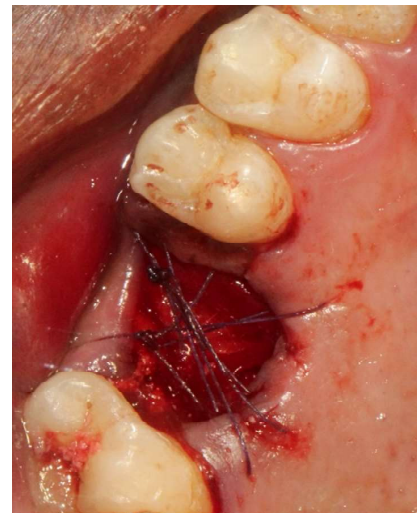


Fig. 9: suturing done

The surgical site was isolated and anesthetized with 2% Lignocaine hydrochloride with adrenaline (1:80000), the implant site was identified and a punch incision was placed to expose the implant and the healing abutment was placed (Fig15-16).

Patient was recalled after 2 weeks for impression making at the implant level for fabricating a cement retained porcelain fused metal crown (Fig.17-18). The prosthesis was fabricated and cemented to the implant abutment, and care was taken to remove the excess cement subgingivally.

DISCUSSION

For the management of the current case, the treatment options suggested to the patient were atraumatic extraction of 16 followed by alveolar ridge preservation and delayed implant placement, or atraumatic extraction of 16 followed by immediate implant placement with using bone graft materials and indirect sinus lift procedure if required, or atraumatic extraction of 16 followed by fixed prosthesis taking 15 and 17 as abutments. Taking several factors into consideration such as age of the patient, reducing patient morbidity, importance of the tooth to be extracted which is strategic in the dental arch, the treatment plan of atraumatic



Fig. 10: 2 weeks post-operative



Fig. 11: 2 months post-operative



Fig.12: Pre-implant placement radiograph



Fig. 15: 3 months post implant placement radiograph



Fig. 13: Noble Biocare 4.3x11.5 Implant placed



Fig. 14: immediate post-Implant placement radiograph

extraction followed by alveolar ridge preservation using xenogenic bone graft and collagen membrane with delayed implant placement was chosen as treatment of choice.

Dimensional changes of alveolar bone and soft tissues occurring after tooth extraction are a matter of clinical concern since they jeopardise aesthetic and functional results in implant dentistry.

Alveolar ridge preservation also known as socket preservation, involves any procedure developed to eliminate or limit the negative effect of post-extraction resorption, maintain the soft and hard tissue contour of



Fig. 16: healing abutment placed



Fig. 17: Post prosthetic rehabilitation

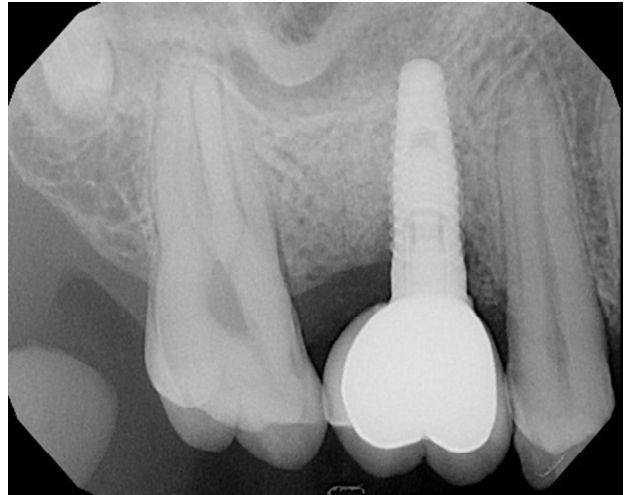


Fig. 18: Post prosthetic rehabilitation radiograph



Fig. 19: 6 months follow up



Fig. 20: 6 months follow up radiograph

the ridge, promote bone formation within the socket and facilitate implant placement in a prosthetically driven position.

The healing process of the alveolar bone after an extraction is divided into two phases;

- Bundle bone is quickly resorbed and replaced by woven bone
- The external surface of the alveolar bone is resorbed causing horizontal contraction.

Systematic review by Lang et al. (2012)⁵ stated that the mean dimensional changes of alveolar ridge within 6 months after tooth extraction was found to be:

- Mean horizontal reduction in ridge width: 3.8 mm.

- Mean vertical reduction in ridge height: 1.24 mm.

Post-extraction maintenance of the alveolar ridge minimizes ridge resorption and, facilitates subsequent implant placement satisfying esthetic and functional criteria. Implant placement after alveolar ridge preservation and immediate implant placement have been proven effective to resolve post extraction complications.⁶

The proximity of the sinus floor and the root apex may accelerate the process of pneumatization in the posterior maxilla post extraction.⁷ It was reported that sinus pneumatization was noted following extraction of teeth surrounded by a superiorly curving sinus floor. A cross sectional study using CBCT demonstrated sinus pneumatization predominantly occurring at extraction sites where the sinus floor was located more apical than the root apex, and hardly occurred at the sites located coronal than the root apex.⁸ However, cha et al reported

no correlation was found between the extent of sinus pneumatization and the anatomy of the sinus floor.⁷

Xenografts have shown excellent properties for GBR, such as biocompatibility, osteoconduction, slow resorption rates, and their ability to define and maintain the volume of bone gain. In the current case, Bio-Oss® pen was selected as the graft material due to their reproducible results with acceptable success rates and low occurrence of complications, besides providing lower morbidity for the patient.

Barrier membranes have been shown to preserve alveolar ridges and provide beneficial results following tooth extraction in clinical trials. The artificial membrane could seal off the socket for a healing period of up to several weeks. Extraction sockets covered by porcine-derived collagen membrane alone showed significantly lower vertical and horizontal bone changes, compared to spontaneous healing.

Kakar et al. assessed bone formation and ridge width preservation after socket grafting using in situ hardening biphasic bone graft substitute, noticed that all the sites were completely covered with newly formed keratinized soft tissue, and since adequate zone of keratinized gingiva is an important parameter for achieving a more esthetic restoration preventing further mucosal recessions, thereby improving the long-term stability of the implant. In the current case, to achieve complete coverage of keratinized soft tissue, collagen membrane (Cologide®) was placed and stabilized with sutures.⁹

A flapless procedure is preferred over the use of barrier membrane which requires a full thickness flap reflection to place the membrane. Elevating the periosteum from the buccal bone to create a mucoperiosteal flap will compromise the blood supply of the exposed bone surface, leading to osteoclastic activity and increased bone resorption.² Mucograft® seal is advantageous as it does not require flap elevation for stabilization at the membrane, thus making the procedure minimally invasive.

A recent meta-analysis further suggested that the choice of the biomaterial did not have a significant influence on the ridge preservation after tooth extraction and that all materials sufficiently maintained the ridge dimensions.⁶

Limitations of the current case was CBCT assessment could have been performed after placement of the graft and compared with pre-implant CBCT to establish the accurate level of preserved bone for demonstrating the predictability of alveolar ridge preservation as the treatment of choice for management of post extraction socket. Also, primary wound closure was not possible due to the wide architecture of the socket, exposing the

barrier membrane, which might be a source of infection delaying the wound healing. However, there were no signs of infection at the healing site. This limitation can be avoided by using Mucograft seal which has a diameter of 8mm and can be placed on the socket entrance and sutured thereby providing the appropriate seal of the socket for a successful management and a more predictable result. In the current case, the bone quality was not assessed which could provide evidence for using xenograft material in management of post-extraction socket.

The current case with a 6 month follow up clearly demonstrates sufficient bone fill and an acceptable vertical loss of the alveolar bone as a successful management of an unrestorable tooth by ridge preservation using xenogenic bone graft materials and collagen membrane as barrier membrane followed by delayed implant placement and prosthetic rehabilitation.

CONCLUSION

Alveolar ridge preservation is a treatment protocol which can be considered for management of unrestorable teeth in esthetic or functionally strategic position in the dental arch. The alveolar ridge preservation technique reduces the loss of bone structure, preserving the shape and contour of the bone which plays a key role in implant placement and it is known to minimise further requirements of bone augmentation procedures. The current case demonstrates that alveolar ridge preservation as a viable and a more predictable treatment option for better stability and success of the implant.

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