

Alveolar ridge preservation and biologic width management for perioaesthetics- a case report

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Abstract

Alveolar bone atrophy is a chronically progressive, irreversible process which results in bone loss in both the buccal, lingual and apico-coronal region. Without bone preservation measures, bone resorption is experienced and continues for life. Preservation of alveolar ridge is indicated when a tooth-supported fixed partial denture will rehabilitate the area. Authors report a case wherein alveolar ridge was preserved and simultaneously biologic width violation was corrected. An excellent aesthetic outcome was achieved and the patient was satisfied with the case resolution. Ridge preservation is an easy procedure to perform and almost always, results are predictable. It provides a good esthetic and functional benefit to the patient and the clinician.

Key words: Alveolar ridge, ridge preservation, biologic width, resorption

Introduction

Tooth extractions almost always result in loss of bone and soft tissue, and often lead to compromised function in spite of the use of implants and prosthodontic procedures.^(1, 2) There are numerous reports describing extraction socket healing⁽³⁾; however, radiographic evaluation of alveolar ridge dimensions have shown that there is a loss of height and width when comparisons are made with pre- and post-extraction ridges⁽⁴⁾.

Alveolar ridge defects occur when the loss of teeth results in a dimensional loss of bone and soft tissue surrounding the alveolus. The problem of ridge defects has been primarily esthetic, especially if it is in the esthetic zone; but it does have a functional role with the increased use of dental implants.

Some causes of alveolar socket defects include a surgically created defect to gain access and extract the tooth by removing the buccal wall, a dehiscence defect, a deep periodontal pocket on one or more sides of a tooth, a split root, a previous apical surgery or advanced periodontitis⁽⁵⁾. When one or more walls of the alveolar socket are missing, the healing potential of the socket is compromised and socket grafting is indicated to preserve the ridge morphology.⁽⁵⁾ In the recent years, periodontal plastic and reconstructive surgery has been widely used for all mucogingival surgical procedures as well as other procedures like root coverage, functional crown lengthening, ridge preservation, ridge augmentation, maintenance of interdental papilla, esthetic soft tissue surgery around implants and surgical exposure of teeth for orthodontic purpose.

When a tooth is being restored subgingivally, the biologic

space surrounding the abutment should not be violated under any circumstances.^(6,7) The intracrevicular profile of a restoration intended to support the free gingiva and papilla should be designed to provide easy cleansing of its surface as well as a natural emergence of a crown to the oral cavity.⁽⁸⁾ Whereas, overcontouring of restoration at the buccal or palatal surface results in an unstable response of the gingiva, often leading to gingival recession or inflammatory gingival hyperplasia.⁽⁹⁾ This report presents a case where ridge preservation was carried out to prevent collapse along with correction of the violated biologic width.

Case report

A 21 year old dental student reported to the Department of Periodontics, The Oxford Dental College, India, with inflamed gingiva with respect to the maxillary right anterior teeth. She was also not happy with the aesthetics of the fixed partial denture (FPD) present in the same region.

On examination, the gingiva over her maxillary right central incisor⁽¹¹⁾ was inflamed (**Figure 1**). She experienced tenderness when the region was probed with a periodontal probe. The missing right lateral incisor⁽¹²⁾ had been replaced with a FPD using the adjacent central incisor⁽¹¹⁾ and canine⁽¹³⁾

Table 1: Clinical results of measurement of ridge before and after ridge preservation

Measurements	Pre-surgical	Post-Surgical (9 month5)
Horizontal Dimension (in mm)	6	7
Vertical Dimension(in mm)	3	2

teeth as abutments. On further enquiry, the reason for extraction was trauma to the lateral incisor.

The intra oral periapical (IOPA) radiograph revealed a fractured root piece of the right lateral incisor embedded within the socket (**Figure 2**). With careful planning it was decided to surgically extract the root piece and carry out the socket wall preservation or ridge preservation technique to prevent compromising the ridge height subsequently.

At the first appointment, curettage was carried out for 11. The bridge was removed carefully with a crown remover and the margins were trimmed. The inflammation drastically reduced within 2 days. At the 2nd appointment, ridge preservation technique was carried out. Two measurements were recorded preoperatively with calipers using fixed reference points; one, the vertical height of the ridge along the long axis of the tooth, and the other, along the buccopalatal axis.

The surgical site was prepared by placing two vertical incisions on the labial aspect and one horizontal incision on the crest of the alveolar ridge (**Figure 3**). Care was taken to preserve the papilla of adjacent teeth. A full thickness mucoperiosteal flap was reflected. A small perforation (about 1.0cm long and 0.5cm wide) was made on the labial plate; the root piece was identified and removed carefully with an Apexo elevator (**Figures 4 and 5**).

Granulation tissue was curetted thoroughly from the defect to facilitate the penetration of bone forming cells and the growth of blood vessels into the bone graft material. Fresh bleeding sites were created within the alveolus with a bud bur (small, 0.1-1.5). Bovine derived bone graft material (Bio-Oss 0.25-1mm, Geistlich Biomaterials) was loosely placed both within the bony defect and over the labial plate. The bone graft material was covered with a resorbable collagen membrane (Proguide, Equinox). The membrane was properly trimmed and tucked below the mucoperiosteal flap and closed to completely cover the graft (**Figures 6 and 7**).

A periosteal releasing incision was performed on the flap for complete flap approximation. The flap was then sutured by placing direct interrupted suture (4-0 Mersilk non resorbable suture, Ethicon, Johnson & Johnson) (**Figures 8**). Slight pressure was applied to the surgical area with sterile gauze to obtain initial flap adaptation. Periosteal dressing was not adapted though it is habitually used. The old FPD was fitted as a provisional measure.

The patient was asked to refrain from brushing at the surgical site for the next 2 weeks. An antibiotic (amoxicillin 500mg, 3 times daily) was prescribed. Mouthrinse (chlorhexidine gluconate 0.2%) was advised twice daily along with oral analgesics (ibuprofen 200mg) as needed. After 8 weeks, a new FPD with margins (finish lines) at the gingival level was fabricated and fitted.

The 2 week post operative follow up visit showed good healing with minimal post surgical inconvenience (**Figure 9**).

There was no exposure of the membrane or any exfoliation of the graft material. The 6 month post operative measurement showed clinically significant increase in height and width of the alveolar bone in the operated region (**Table 1, Figure 10**). The clinical result is also supported by the 9 month post operative radiographic evaluation which shows corresponding increase in vertical dimension of the augmented ridge (**Figure 11**). The patient was also quite happy with her smile as evident in the picture (**Figure 12**).



Figure 1: Pre treatment photograph with inflamed gingival margin of the right central incisor

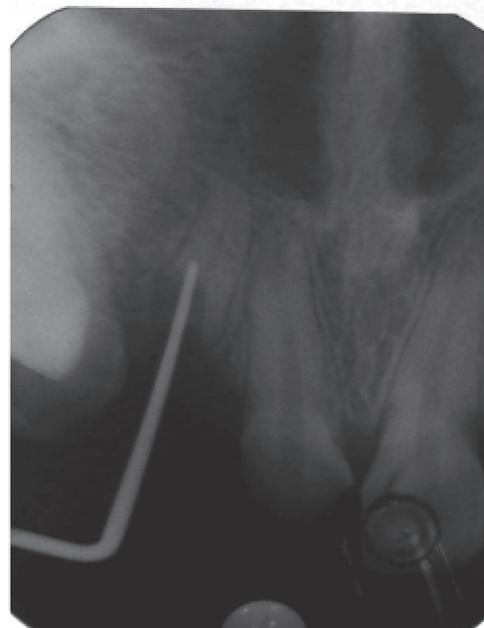


Figure 2: Pre operative radiograph showing root piece within the bone



Figure 3: One horizontal incision on the crest of the ridge and two vertical incisions placed on the labial ridge

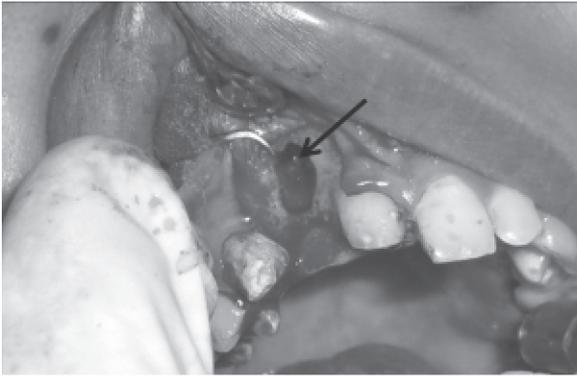


Figure 4: Perforation made over the labial plate and root piece identified (Arrow mark pointing towards the root piece)



Figure 5: Extracted root piece



Figures 6 & 7

Bone graft placed and covered by collagen membrane



Fig 8: Sutures placed



Fig 9: Two week post operative photograph showing satisfactory healing



Fig 10: Six month postoperative photograph

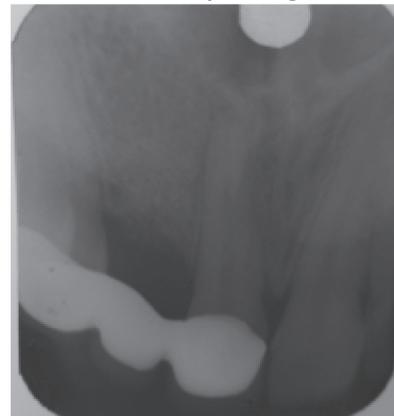


Figure 11: Nine month postoperative radiograph showing increase in vertical dimension



Figure 12: One year post operative photograph of the patient.

Discussion

Following extraction of anterior maxillary teeth, residual ridge resorption will occur, particularly if the buccal alveolar plate is lost⁽¹⁰⁾. Ingrowth of connective tissue into such bony defect causes anatomic aberration and functional disturbances⁽¹⁰⁾. Therefore, localized edentulous ridge augmentation procedures are especially useful to create more esthetic restorative results when a FPD is to replace the missing teeth in the anterior maxilla. However, a ridge augmentation procedure is a re-entry procedure intended to repair a deformity that has already occurred. Hence, a surgical procedure to preserve the residual alveolar ridge is more preferred as it prevents the need for surgical re-entry.

In the present case, there was an increase in the ridge dimensions (both vertical and horizontal) when they were measured at the subsequent post operative visit. The esthetic outcome was also satisfactory for both the clinician and the patient.

While correcting bony defects, consideration must be given to the combined effect of the loss of both hard and soft tissues on the ridge width⁽¹¹⁾. In this case an extrasocket buccal overlay osseous graft was used, in addition to the intrasocket osseous filling, since the buccal alveolar plate was also lost during extraction of the root piece. This technique may have helped to compensate for the loss of soft tissue thickness. Iasella et al used only an intrasocket osseous filling and a collagen membrane and observed a decrease in ridge width⁽¹¹⁾. Since in the present case, complete flap closure was achieved without exposure of the graft, the outcome was accounted to be favourable.

Bio-Oss natural bone mineral offers predictable results, which have been proven through years of clinical experience and are extensively documented⁽¹²⁻¹⁴⁾. It is highly osteoconductive thereby allowing bone regeneration to occur^(13,14). Bio-Oss is an inorganic bovine bone that can be used alone or in combination with barrier membranes in isolated lesions such as periodontal defects, dehiscences and fenestrations around implants and in small osteotomies⁽¹⁵⁾. The use of Bio-Oss in combination with a slowly resorbing collagen membrane showed that the bone mineral provided adequate space for regeneration to occur and adequate support of the membrane for successful Guided Bone Regeneration (GBR)⁽¹⁶⁾.

Over-extension of the FPD margins is often associated with adverse outcomes such as inflammation of the gingiva. This commonly results in the violation of the biological

width which also has an effect over the aesthetics⁽⁹⁾. In the present case, the over-extended margins of the existing FPD was trimmed, which resulted in the correction of the biological width. The effects were evident within 1 week. It was ensured that the margins of the new FPD would only extend up to the gingival margin and hence help in preserving the biologic width of the gingival tissues. In the present case, a dual advantage of both preservation of the alveolar ridge and correction of the biologic width was achieved.

Conclusion

Ridge preservation should be a routinely used procedure in dental practice since it is easier to perform and has the advantage of completing both extraction and preserving the ridge in the same appointment. Moreover, it provides a good esthetic and functional benefit to patients and dentists. An effort to maintain equigingival margins while fabricating the FPD would help in preserving the biological width and further improve the esthetics.

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