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The Roll Flap Approach: Enhancing Esthetics and Soft Tissue Architecture in Anterior Maxillary Tooth Replacement -A Case Report

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Abstract: Esthetic rehabilitation in the maxillary anterior region is often challenged by ridge deformities following tooth loss, which compromise both function and appearance. This case report describes the use of the roll flap technique for soft tissue augmentation in a 48-year-old male patient with a Siebert Class II ridge defect in the anterior maxilla. The patient presented with deficient soft tissue following extraction of the right central incisor. A buccal roll flap procedure was performed to enhance the apico-coronal soft tissue height and restore natural gingival contours prior to prosthetic rehabilitation. Postoperative healing was uneventful, with significant improvement in ridge form and soft tissue volume, resulting in an esthetically pleasing outcome. Long-term follow-up confirmed stable tissue integration and harmonious blending with adjacent gingiva. The roll flap approach proved to be a simple, reliable, and minimally invasive method to enhance esthetics and soft tissue architecture, eliminating the need for a secondary donor site and ensuring favorable restorative outcomes in the anterior maxillary region.

Keywords: *Roll Flap, Ridge Augmentation, Soft Tissue Esthetics, Siebert Class II Defect, Anterior Maxilla, Periodontal Plastic Surgery.*

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I. INTRODUCTION

In the current era, aesthetics has become the most important aspect of dental treatment, as patients demand more natural dental solutions, especially for replacing missing teeth.[1]. Adult patients may experience tooth loss in the maxillary anterior zone as a result of internal or external tooth resorption, root fractures, unsuccessful root canal therapy, or facial trauma. [2] The maxillary alveolar ridge of the extracted tooth will resorb during the normal healing and repair process, resulting in a distortion in the size and shape of the hard and soft tissues. [3] The alveolar ridge's labial and coronal features undergo the biggest alteration when the extraction sites heal, losing both horizontal and vertical ridge dimensions. Any alteration in the hard and soft tissue ridge profile of the alveoli is undesirable because it might lead to impaired aesthetics or the failure of restorative therapy.[4]

- *According to Siebert (1983) Ridge Defects can be Divided into Three Classes:5*

- *Class I:*
  Loss of bucco-lingual width but normal apico-coronal height.

- *Class II:*
  Loss of apico-coronal height but normal bucco-lingual width.

- *Class III:*
  A combination of loss of both height and width of the ridge.

II. CASE REPORT:

A 48-year-old male patient was referred from the department of prosthodontics for deficient soft tissue in his upper front tooth region. [Figure.1] Patient gives a history of the extraction of his upper right central incisor 4 months ago. He had a Class II Siebert ridge defect, with an apico-coronal height measuring 4mm, [Figure 2] with normal bucco-lingual

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width [Figure 3] and was given a treatment option of a fixed partial denture for the missing tooth. The treatment plan included soft tissue augmentation with the help of a roll flap procedure to bring back gingival esthetics, followed by a fixed partial denture.

III. THE ROLL FLAP PROCEDURE

The buccal roll flap procedure is used in the treatment of small to moderate class I or class II ridge defects. The technique enables the surgeon to augment tissue coronally and labially to the cervical area of a pontic and to give the recipient site the appearance of a normal tooth-gingiva interface. Hence, a ridge concavity can be converted into a ridge convexity resembling the eminence produced by the roots of the adjacent teeth.

Following examination, oral prophylaxis was carried out, and an impression of the maxillary arch was made to prepare an acrylic stent to place post-surgery. The patient was recalled after one week and revealed good gingival health. Ridge augmentation using the roll flap procedure was carried out.

Adequate local anaesthesia was achieved with 2% lignocaine with 1:80,000 dilution of adrenaline [Figure 4]. An 'H'-shaped surgical incision line was marked using an eosin pencil in the palatal aspect, followed by a sulcular incision in the buccal aspect. [Figure 5,6]. From the distal part of 'H' incision, a partial thickness flap was raised [Figure 7,8] and a rectangular pedicle of supraperiosteal connective tissue was prepared and raised from the palate using sharp dissection along with the buccal aspect of the tissue.[Figures 9] A pouch was made in the supraperiosteal connective tissue at the facial (labial) surface of the ridge. [Figure 10, 11] The extraction socket, which had a concave defect was filled with the xenograft. [Figure 12, 13] The pedicle was tucked into the pouch, partially covering the socket using 4-0 Vicryl resorbable sutures close to the mucobuccal fold so as to pull the pedicle into the desired portion of the pouch. The epithelium on the palatal surface was given simple interrupted sutures using 4-0 Vicryl. [Figure 14]

IV. POST-OPERATIVE CARE:

Haemostasis was achieved and aluminium foil was placed in the surgical site, followed by a periodontal dressing. Postoperative instructions were given to the patient, analgesics and antibiotics were prescribed. The patient was recalled 5 days post-operative and an acrylic stent was placed, which was designed to support the augmented soft tissue and cover the grafted site. [Figure 15] After 10 days, suture removal was done.

V. RESULTS:

Patient was recalled after 1month and on examination, there was an increase in the soft tissue height (apico-coronally) of more than 2mm at the surgically treated area [Figures 16,17]. Two months post-surgery, a temporary fixed prosthesis was placed from canine to canine [Figures 18]. The final 6-unit Zirconia bridge was then cemented 3 months post-surgery with excellent esthetic results. The patient was recalled 8 months post-operative with completely satisfactory results [Figure 19,20]. The long-term healing results in improved ridge form, enhanced soft tissue volume, and harmonious integration with adjacent gingiva, thereby facilitating natural-looking restorative outcomes.

VI. DISCUSSION:

Tooth loss results in significant atrophy of the alveolar process, with loss of hard and soft tissues. If soft tissue shape loss during rehabilitation is not appropriately addressed, it will lead to less than ideal fixed prosthetic aesthetics, particularly in the aesthetic zone. Abrams was the first to describe a flap technique for deformed residual edentulous areas.[6] Scharf and Tarnow later updated Abram's roll technique in 1992 and called it a "trap-door" technique. The epithelium covering the connective tissue pedicle was reflected and preserved by the flap, and the epithelial pedicle was then applied to the donor location.[7] Since then, multiple techniques have been proposed for soft tissue augmentation, including subgingival connective tissue grafting, roll technique, pouch roll technique, modified roll technique, and mixed grafts. In addition to enhancing appearance, the increased soft tissue bulk gives the prosthesis functional protection, which enhances its prognosis.[8,9,10]

VII. CONCLUSION:

The buccal roll flap technique is a simple, reliable, and minimally invasive approach for soft tissue augmentation, particularly in the maxillary anterior region where esthetics are critical. By utilizing adjacent palatal or alveolar connective tissue, it provides a predictable increase in soft tissue thickness, improved ridge contour, and enhanced esthetic integration with restorative prostheses. The technique avoids the need for a secondary donor site, reduces patient morbidity, and achieves favourable long-term stability when performed with proper case selection and surgical precision. Overall, the buccal roll flap remains a valuable and effective procedure in periodontal plastic and prosthesis related therapy for achieving both functional and esthetic outcomes.

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➢ *Figures and Tables*

Fig 1 Pre-Operative.

Fig 2 Sibert's Class II Ridge Defect Irt 11

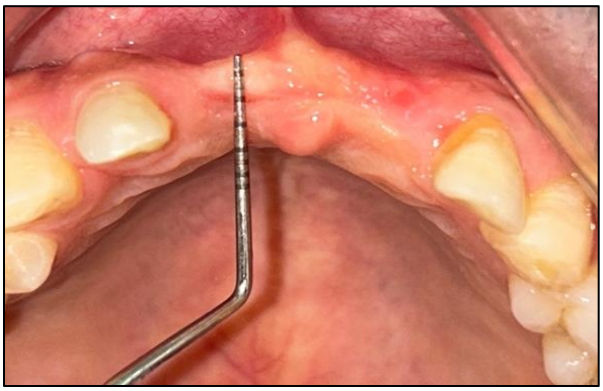

Fig 3 Bucco-lingual width

Fig 4 Administration of LA.

Fig 5 Surgical Incision Planning Buccal.

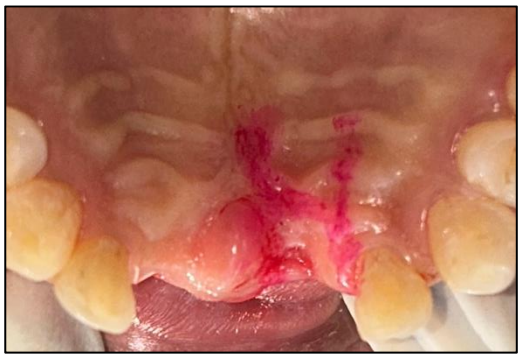

Fig 6 Surgical Incision Planning Palatal

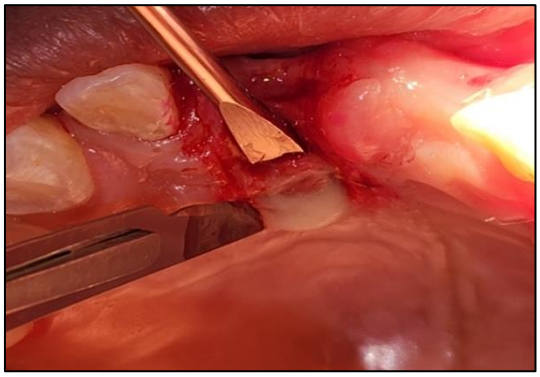

Fig 7 Partial Thickness Flap was Incised

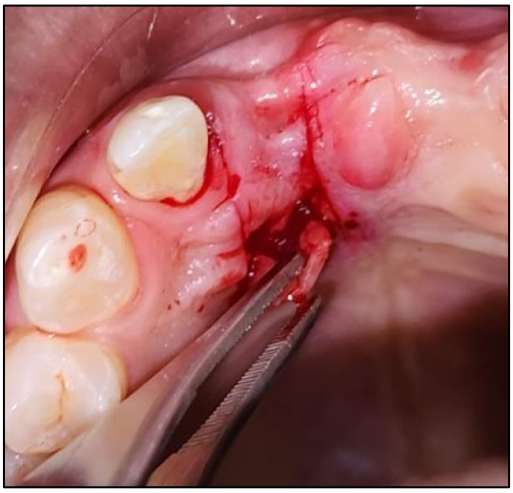

Fig 8 Partial Thickness Flap was Raised

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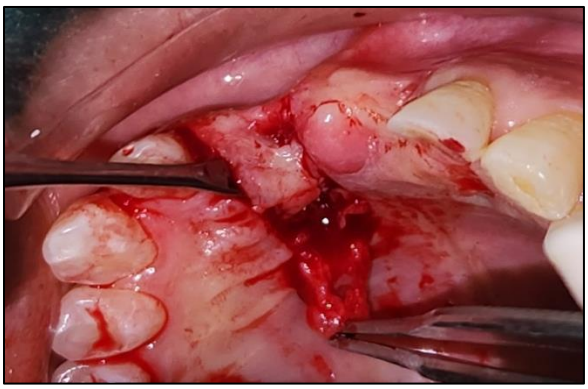

Fig 9 A Rectangular Pedicle of Supraperiosteal Connective Tissue was Raised .

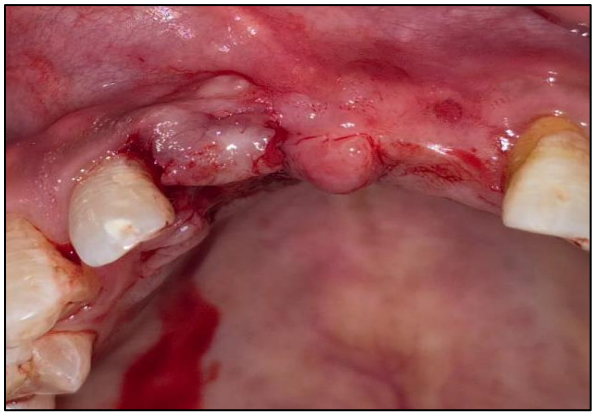

Fig 10 APouch was Made at the Labial Surface of the Ridge

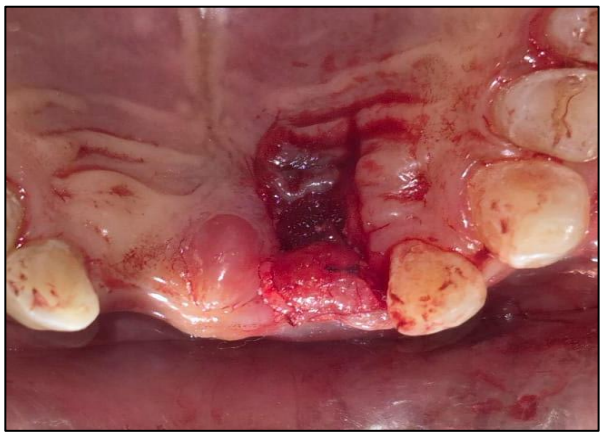

Fig 11 A Pouch was Made at the Labial Surface of the Ridge [Occlusal View]

Fig 12 The Extraction Socket .

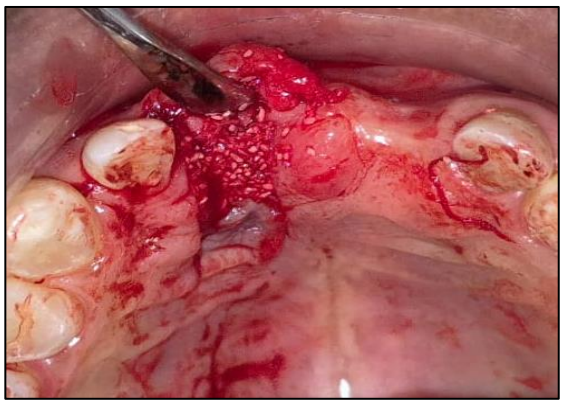

Fig 13 Socket Filled with the Xenograft

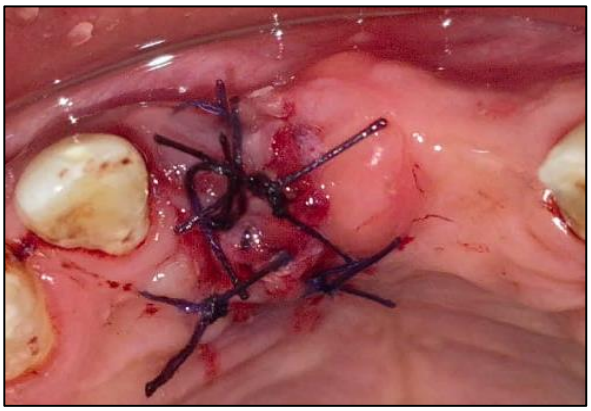

Fig 14 Stabilized the Pouch with Sutures Using 4-0 Vicryl

Fig 15 Acrylic Stent was Designed to Support the Augmented Soft Tissue

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Fig 16 One Month Post-Operative Measurement

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Fig 17 One Month Post-Operative Palatal View

Fig 18 Two Months Post-Surgery, Temporary Fixed Prosthesis From Canine to Canine

Fig 19 Final 6 Unit Zirconia Bridge Three Months Post-Surgery

Fig 20 Final 6 Unit Zirconia Bridge [Palatal View]

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