Techniques of Soft Tissue Ridge Augmentation – An Overview

INTRODUCTION
Residual ridge resorption is an inevitable process which follows the tooth loss and if excessive lead to compromised prosthetic procedures like inability to place implants and unaesthetic pontics. This can be treated by a procedure called ridge augmentation which is done to increase volume, width and height of residual ridge to receive and retain dental prosthesis.

We can broadly classify ridge augmentation procedures in to hard tissue augmentation and soft tissue augmentation procedures. Hard tissue augmentation procedures are those which are done to increase the bone and its supporting structure before placing the implant whereas soft tissue augmentation is mainly aimed to enhance the soft tissues alone particularly before placing fixed partial denture to avoid unaesthetic pontics.

RESIDUAL RIDGE DEFECTS
The most commonly used classification are

SIEBERT – 1983

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
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<tbody>
<tr>
<td>Class I</td>
<td>Bucco-lingual loss of tissue with normal apico-coronal ridge height.</td>
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<tr>
<td>Class II</td>
<td>Apico-coronal loss of tissue with normal bucco-lingual ridge width</td>
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<tr>
<td>Class III</td>
<td>Combination type defects with both height and width loss</td>
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ALLEN IN 1985

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<tr>
<td>Class A</td>
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</tr>
<tr>
<td>Class B</td>
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<tr>
<td>Class C</td>
<td>Combination of apico-coronal and bucco-lingual loss of tissue</td>
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TECHNIQUES OF SOFT TISSUE AUGMENTATION
The different techniques involved in soft tissue augmentation procedure involve use of either autogenous grafts harvested from patients or any commercially available materials to be used with any one of the following procedures. The type of procedure is determined by the clinician based on the type of ridge defect. The various procedures are

1. Pouch graft procedure
2. Roll flap technique
3. Modified roll flap technique
4. Onlay epithelized grafts
5. Interpositional graft technique
6. Combined onlay interpositional graft

1. POUCH OR ENVELOPE FLAP PROCEDURE
Siebert in 1993 introduced this procedure which involves connective tissue graft along creation of sub epithelial pouch in the ridge defect area by making a partial thickness horizontal incision in the crest of ridge. The incision is extended apically and laterally over the deformity and connective tissue graft is inserted in to the pouch and sutured using 4-0 / 5-0 silk sutures. The connective tissue used for this purpose mostly harvested from maxillary tuberosity to obtain stable graft along with ridge enhancement. This procedure can also be accompanied with use of bone grafts to obtain better results.

2. ROLL FLAP TECHNIQUE
Roll flap technique was originally advocated by Abrams 1980. This technique involves the stripping of epithelium from connective tissue of pedicle flap which is obtained from the palate. A full thickness vertical incision is made initially in defect area joining the partial thickness horizontal incision which is made over the crest of residual ridge and flap is raised. The pedicle connective tissue is now rolled under buccal mucosa in order to correct bucco lingual ridge defects.

3. MODIFIED ROLL FLAP TECHNIQUE
Scharf in 1992 introduced this technique which involves use of de epithelized connective tissue pedicle flap which can be used in small or moderate class I defects. In this technique a full thickness vertical incision is made from mesial aspect of deformed ridge towards the palatal aspect. This incision should meet a partial thickness horizontal incision made on the crest of edentulous ridge. The reflection of palatal connective tissue graft initiated at apical end and moved coronally to the crest of ridge. Graft is folded in to two pieces and rolled in to the pouch and then stabilized with resorbable sutures.

4. ONLAY EPITHELIZED GRAFT
Onlay grafts are epithelized free gingival graft which is placed over connective tissue of de-epithelialized recipient site.( Siebert 1983). They can be used in large siebert class II & III defects. This technique involves gain in ridge height which can be attained gradually by repeating the procedure in two to three months.
As a result, an onlay graft maintains their intact epithelium over the connective tissue. The graft is secured with its connective tissue base in contact with de-epithelialized recipient site. Significant ridge correction can be achieved by this technique, but due to color difference between palatal and gingival tissue, it may create unpleasant esthetic results and hence not advocated in aesthetic areas. The other disadvantages include post-operative shrinkage in case of inadequate blood supply and unpredictable shrinkage of grafts.

5. INTERPOSITIONAL GRAFTS
Interpositional graft is used to correct class I and II ridge defects. The recipient site is prepared in a similar way to pouch procedure by making a partial thickness horizontal incision and extending it horizontally and apically and then inserting a thick, wedge-shaped connective tissue graft. The graft is finally sutured leaving a epithelial surface at the level of surrounding tissue.

6. COMBINED ONLAY INTERPOSITIONAL GRAFT
Siebert and Louis in 1996 developed this procedure mainly to treat Siebert class III ridge defects. This is a combination of two procedures onlay epithelialized grafts and interpositional sub epithelial connective tissue grafts.

PROCEDURE
With the 15c scalped blade epithelium over the coronal aspect of the residual ridge is removed. Vertical grooves are advocated extending it horizontally and apically and then inserting a thick, wedge-shaped connective tissue graft. The graft is finally sutured leaving a epithelial surface at the level of surrounding tissue.

IN VIVO STUDIES
With the limited literature available for different techniques the long-term predictability were assessed based on various factors present in the patient and patient compliance. The following are various studies in which different techniques of soft tissue augmentation are applied and its outcome is reviewed.

<table>
<thead>
<tr>
<th>AUTHOR</th>
<th>TYPE OF PROCEDURE</th>
<th>RESULTS</th>
</tr>
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<tbody>
<tr>
<td>Han et al 1995</td>
<td>Free gingival graft strips covered with tinfoil &amp; dressing</td>
<td>Increase in keratinized gingiva</td>
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<tr>
<td>Block 1999</td>
<td>Palatal roll flap to cover exposed metal after implant</td>
<td>Enhanced aesthetics with patient smile</td>
</tr>
<tr>
<td>Price and Price 2000</td>
<td>Connective tissue graft in first surgery followed by coronally advanced flap after 17 days</td>
<td>Treated for Siebert class III ridge defect</td>
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<tr>
<td>Mathews 2002</td>
<td>Pediculated connective tissue graft</td>
<td>Visible black triangle reduced.</td>
</tr>
<tr>
<td>Shibli et al 2004</td>
<td>Connective tissue graft with coronally advanced flap.</td>
<td>Sufficient gain in height and width</td>
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<tr>
<td>Shibli and d'Avila 2005</td>
<td>Sub epithelial connective tissue graft and coronally advanced flap in both cases</td>
<td>Facial margin apical to adjacent tooth</td>
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<tr>
<td>Yan et al 2006</td>
<td>Free gingival graft with antibiotics</td>
<td>Increase in keratinized gingiva</td>
</tr>
<tr>
<td>David L. Hoexter 2009</td>
<td>Sub epithelial connective tissue graft – Pouch method</td>
<td>Favorable outcome</td>
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CONCLUSION
In this present review various techniques of soft tissue augmentation along with their corresponding studies is reviewed. Although there are various techniques available for use of soft tissue augmentation the best possible technique for particular individual should be decided by the clinician based on various factors present in the patient. Sufficient knowledge on different techniques and various grafting methods is essential for proper case selection and successful treatment outcome.
REFERENCE


Alan Edel. Clinical evaluation of free connective tissue grafts used to increase width of keratinised gingival. Journal of Clinical Periodontology. 1974; 1: 185-196


