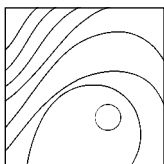


## Pouch Roll Technique for Implant Soft Tissue Augmentation: A Variation of the Modified Roll Technique



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*This paper presents three cases of peri-implant mucosal defects that were successfully treated with a newly proposed "pouch roll" implant soft tissue augmentation technique. This procedure uses a de-epithelialized connective tissue layer during the first or second stage of implant surgery over the underlying dental implant without the need for sutures. At 2 weeks, healing was remarkable, with excellent plaque control. At 3 months, only minimal tissue shrinkage was evident. As a result, a 2- to 3-mm increase in the width of the keratinized tissue was noted around the augmented implant site. This technique is an atraumatic, versatile, and cost-effective surgical modality that enhances the peri-implant soft tissue over the ridge with a soft tissue thickness  $\geq 3$  mm. The pouch roll implant soft tissue augmentation procedure provides an easy and less traumatic correction of a mild to moderate buccal ridge deficiency by thickening the soft tissue around the dental implant. (Int J Periodontics Restorative Dent 2012;32:e116–e121.)*

Postextraction ridge collapse is a common clinical challenge in contemporary implant dentistry. The amount of horizontal and vertical ridge loss may reach up to 60% within 2 years of tooth extraction,<sup>1</sup> most of which occurs within the first year of tooth loss.<sup>2</sup> Even in the presence of an immediate implant, buccolingual width collapse of the healing extraction socket has been recorded to reach up to 4.2 mm.<sup>3</sup> This ridge loss is encountered more frequently in the absence of adequate buccal bone thickness.<sup>4</sup> Seibert<sup>5</sup> and Allen et al<sup>6</sup> classified this ridge deficiency by assessing the volume of the soft tissue alone, while Lekholm and Zarb,<sup>7</sup> Misch and Judy,<sup>8</sup> Palacci and Ericsson,<sup>9</sup> and Wang and Al-Shammari<sup>10</sup> proposed a classification with respect to the underlying hard tissue.

Soft tissue augmentation techniques may satisfactorily and predictably re-create esthetic enhancement in mild to moderate horizontal defects, equivalent to mild to moderate type B defects<sup>6</sup> or H-s/m defects of HVC classification.<sup>10</sup> Many authors have

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**Fig 1a** (left) A buccal mini-pedicle flap outlined the platform of the implant at the maxillary right first molar site and was 1 mm wider than the diameter of the underlying implant platform. It was then de-epithelialized.



**Fig 1b** (right) Full-thickness flap elevation extended to the buccal aspect of the implant site.



**Fig 1c** (left) Mini-pedicle flap rolled underneath the buccal pouch.



**Fig 1d** (right) Occlusal view 2 weeks after surgery.



**Fig 1e** (left) Occlusal view 3 months after surgery.



**Fig 1f** (right) Clinical presentation at 4 months during the impression-taking appointment showed a maintained gingival height.

proposed various soft tissue augmentation techniques for pontic site development over a partially edentulous site. These techniques include a subgingival connective tissue graft,<sup>11-13</sup> the roll technique or a connective tissue pedicle graft,<sup>14-19</sup> full-thickness gingival onlay graft,<sup>5,20</sup> and combination onlay-interpositional grafts.<sup>21,22</sup> Others have either adapted or modified these techniques to accomplish localized ridge augmentation around dental implants during the first or second stage of surgery using a modified roll technique,<sup>15</sup> a rolled split palatal flap,<sup>17,18</sup> or a beveled palatal approach.<sup>23</sup>

This paper presents a “pouch roll” procedure as a variant of the Barone modified roll technique.<sup>15</sup> The modified roll technique allows soft tissue augmentation of the buccal ridge deficiency in limited interdental space during stage-two implant surgery, whereas the pouch roll technique is indicated in single- or multiple-implant sites with a wide interdental space. The main objectives of the proposed technique are to enhance marginal gingival thickness for a more stable gingival margin around the dental implant and to augment a mild to moderate soft tissue deficiency on the buccal aspect of a dental implant site. The

pouch roll procedure accomplishes these two objectives without the use of any sutures, resulting in minimal intraoperative bleeding and postsurgical discomfort throughout the entire healing phase.

## Method and materials

The pouch roll technique was performed around three single implants in three healthy patients: two stage-two surgeries at the maxillary right first molar (Figs 1a to 1c) and maxillary right premolar sites (Figs 2a and 2b) and one case of a simultaneous single-stage



**Fig 2a** H-m class defect (3- to 6-mm horizontal defect according to HVC classification) evident at the buccal aspect of the implant at the maxillary right first premolar site. A buccal mini-pedicle flap was extended into the mucogingival junction and de-epithelialized.



**Fig 2b** Rolled buccal mini-pedicle flap fixed with a 3-mm healing abutment.



**Fig 2c** Three months after surgery, healing showed a 4- to 5-mm width of keratinized tissue buccal to the implant, with a marginal tissue thickness of 3 mm.

osteotome procedure at the maxillary left first molar site (Figs 3a and 3b). The two first molar sites presented with H-s class defects (horizontal defect,  $\leq 3$  mm) while the first premolar site had an H-m class defect (horizontal defect, 3 to 6 mm), according to HVC classification.<sup>10</sup> The dental implant at the first premolar site was intended to serve as an abutment for a maxillary partial overdenture. Therefore, soft tissue enhancement of the marginal gingiva was deemed important and necessary. All three cases showed an altered location of the mucogingival junction as the flap was advanced coronally during either the stage-one surgery or the earlier socket preservation procedure (Figs 1 to 3).

Under local anesthesia, bone sounding was performed to locate the platform of the implant and to measure the overlying soft tissue thickness. Soft tissue thickness over the implant cover screw ranged from 3 to 5 mm in all cases. The pouch roll flap design includes:

(1) outlining the full-thickness palatal mini-pedicle flap 1 mm greater than the diameter of the underlying cover screw (Figs 1a, 2a, and 3a), (2) a partial incision at the hinge portion of the created mini-pedicle flap to facilitate buccal rolling (Figs 1a and 2a), (3) de-epithelializing the mini-pedicle flap (Figs 1a, 2a, and 3a), (4) elevating a full-thickness flap and creating a pouch with an Orban knife (Hu-Friedy) to the length of the mini-pedicle flap (Fig 1b), (5) rolling of the pedicle flap into the created buccal pouch (Figs 1c and 3b), and (6) tightening of a 3- to 5-mm-high healing abutment, which secures the mini-pedicle flap without the use of sutures (Figs 1c, 2b, and 3b).

For postsurgical pain control, 600 mg ibuprofen every 4 to 6 hours was prescribed to all three patients on an as-needed basis. For the patient who underwent a simultaneous single-stage osteotome procedure, 500 mg amoxicillin was prescribed three times daily for 5 days. Except for the latter case, patients were instructed to begin

brushing at the surgical site immediately on the evening of surgery. Mouth-rinsing with warm salt water was recommended. No postsurgical mouthrinse was prescribed for any patient.

## Results

The mild to moderate localized buccal horizontal depression and marginal gingivae around all three implants were immediately thickened. The final thickness depends on the thickness of the rolled mini-pedicle flap. Minimal bleeding was observed intraoperatively. A healing abutment firmly secured the rolled pedicle flap within the buccal pouch (Figs 1c, 2b, and 3c).

At 2 weeks, all three cases had healed uneventfully without any evidence of soft tissue shrinkage (Fig 1d). A 1- to 2-mm gap formed at the buccal aspect between the healing abutment and the hinge portion of the rolled pedicle flap, which was filled with soft tissue. Minimal



**Fig 3a** H-s class defect ( $\leq 3$ -mm horizontal defect according to HVC classification) present at the maxillary left first molar site. The mucogingival junction was located near the ridge crest, and a mini-pedicle flap was outlined extending beyond the mucogingival junction.



**Fig 3b** A  $4 \times 11.5$ -mm dental implant was placed with a simultaneous osteotome procedure. A 3-mm-high healing abutment secured the buccally rolled pedicle flap.



**Fig 3c** The 3-month postsurgical evaluation revealed a 2-mm increase in keratinized tissue at the buccal aspect of the implant.

plaque was present since patients were instructed to brush over the surgical site on the evening of surgery. The two patients undergoing the two-stage surgeries reported that there was no need for any pain medications throughout the entire healing phase.

Three months of healing revealed mild horizontal soft tissue shrinkage with no evident loss in vertical tissue height in all cases (Figs 1e, 1f, 2c, and 3c). All cases showed a 2- to 3-mm increase in the width of keratinized tissue and a thickening of the marginal gingiva.

## Discussion

This case report used the pouch roll technique for soft tissue augmentation around a dental implant during the first or second stage of implant surgery. The main goal was to correct a mild to moderate buccal ridge deficiency and enhance the marginal gingiva associated with the dental implant.

Achieving and maintaining an adequate marginal gingiva thickness as well as a sufficient width of keratinized tissue at an early phase of the implant uncover surgery is important for the maintenance of peri-implant health and esthetics. Cardaropoli et al<sup>24</sup> prospectively measured the dimensional alterations of the soft and hard tissues around 11 single-implant restorations over a 1-year postloading period. Buccal and lingual bone loss reached up to 1.3 mm during this time. The respective mean loss in soft tissue height was 0.6 mm for the same period. Most of these changes, however, were reported to occur before loading and likely within the first 4 weeks of the implant uncover procedure.<sup>3,25,26</sup> The degree of mucosal collapse has also been reported to depend on the biotypes of the peri-implant mucosa.<sup>27,28</sup> Therefore, transforming the thin to medium-thickness gingiva to a thicker biotype with reinforced keratinized tissue during the implant uncover procedure

may result in a stable peri-implant soft tissue dimension.

Several procedures have been proposed to accomplish localized ridge augmentation around dental implants. For example, a free gingival graft or subepithelial connective tissue graft might be harvested and fixed in a pouch. However, these do not enhance the thickness of the marginal gingiva. Unlike a free subepithelial connective tissue graft, a pediculated connective tissue design not only augments the ridge deficiency with better vascular supply but also thickens the marginal gingiva around an uncovered implant. The split-palatal flap<sup>18</sup> and beveled palatal approach<sup>23</sup> both use palatal subepithelial connective tissue as the source of the pedicle flap. The Barone modified roll technique, on the other hand, uses only de-epithelialized connective tissue over the implant cover screw.<sup>15</sup>

The pouch roll technique in this case report resembles the Barone modified roll technique in that they

both use de-epithelialized connective tissue over the implant cover screw. Barone et al<sup>15</sup> modified the Abram roll technique during stage-two implant surgery around narrow-platform implants in the lateral incisal position. Because of the limited interdental space, the authors made a sulcular incision along the adjacent teeth to avoid a buccal vertical incision. De-epithelialized tissue was rolled buccally and then secured to the buccal flap using a fixation suture. Two single interrupted sutures were used interproximally to achieve secondary closure. Unlike other pedicle flap techniques,<sup>14,18,23</sup> the modified roll technique did not need a palatal donor site; therefore, healing without risk of sloughing of the superficial split-palatal flap or palatal pain was achieved.

The pouch roll technique presents several novel features. First, there is no need for any sutures. All other soft tissue augmentation procedures use a fixation suture to secure the rolled connective tissue to the buccal flap. Second, the interproximal tissue is completely preserved and heals with primary intention. In contrast, other procedures involve a de-epithelialized interproximal area that heals via secondary intention. Therefore, the pouch roll technique is likely to have minimal or no discomfort and minimal bleeding throughout the entire healing phase. Third, because of routine oral hygiene instituted on the evening of surgery, remarkable plaque control was observed. Furthermore, unevent-

ful healing was observed without use of a postsurgical mouthrinse. Lastly, a 2- to 3-mm increase in the width of keratinized tissue may be expected when the thick tissue is rolled buccally. Biotransformation of the thin peri-implant mucosa to a thick biotype may promote implant stability. A partial gap between the hinge portion of the mini-pedicle flap and the healing abutment was seen to be healed with keratinized tissue at 3 months. The apical portion of the gap, however, remained completely sealed with rolled connective tissue. Like all other procedures reported in the literature, a limitation of the proposed technique is that relatively thick overlying tissue (ie,  $\geq 3$  mm) is needed to adequately perform this procedure.

## Conclusion

The pouch roll procedure is an atraumatic, versatile, cost-effective soft tissue augmentation procedure performed during either single-stage implant placement or two-stage implant surgery. This technique is indicated in the correction of a mild to moderate horizontal buccal ridge deficiency or to thicken the marginal gingiva around dental implants during stage-one or stage-two implant surgery. An increase in keratinized tissue up to 2 to 3 mm occurred in all three cases reported. This procedure not only creates excellent sealing around the healing abutment, but also allows the institution of routine oral hygiene during healing.

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