

# Bridge flap technique as a single-step solution to mucogingival problems: A case series

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## Abstract

Shallow vestibule, gingival recession, inadequate width of attached gingiva (AG) and aberrant frenum pull are an array of mucogingival problems for which several independent and effective surgical solutions are reported in the literature. This case series reports the effectiveness of the bridge flap technique as a single-step surgical entity for increasing the depth of the vestibule, root coverage, increasing the width of the AG and solving the problem of abnormal frenum pull. Eight patients with 18 teeth altogether having Millers class I, II or III recession along with problems of shallow vestibule, inadequate width of AG and with or without frenum pull underwent this surgical procedure and were followed-up till 9 months post-operatively. The mean root coverage obtained was 55% and the mean average gain in width of the AG was 3.5 mm. The mean percentage gain in clinical attachment level was 41%. The bridge flap technique can be an effective single-step solution for the aforementioned mucogingival problems if present simultaneously in any case, and offers considerable advantages over other mucogingival surgical techniques in terms of simplicity, limited chair-time for the patient and the operator, single surgical intervention for manifold mucogingival problems and low morbidity because of the absence of palatal donor tissue.

**Keywords:** Attached gingiva, bridge flap, mucogingival surgery

## Introduction

Mucogingival problems form a definitive diagnosis that includes an array of clinical findings, namely gingival recession (GR), shallow vestibule, inadequate width of attached gingiva (AG) and aberrant frenulum. Surgical endeavor by Goldman<sup>[1]</sup> for the correction of three specific problems, namely periodontal pockets that extend beyond the AG reaching the alveolar mucosa, an abnormal traction of the frenulum that can transmit tension for the gingival margins and cause recessions, and the functional condition of a shallow vestibule that promotes a decrease of the AG levels, initiated the era of mucogingival surgery that has motivated other clinicians to develop numerous refinements. Several surgical procedures have then been described in

continuation by various clinicians for these aforementioned mucogingival entities. These surgical solutions, although possessing their own merits, posed certain difficulties; mainly, their inadequacy to treat other problems simultaneously. A single-step solution to mucogingival problems by a surgical intervention, i.e. “bridge flap procedure,” is the continuation of the same endeavor. The following case series represents a cost-effective single-step entity to correct multiple mucogingival problems at a time with less morbidity to donor tissue and to evaluate the correction gained by this bridge flap procedure.

## Case Report

After clearance from local ethical committee, 18 teeth with recession in eight otherwise systemically healthy non-smoker patients in the age group of 20–40 years, who came with the chief complaint of poor esthetics in the lower anteriors due to recession and/or hypersensitivity, were selected for the procedure after phase one therapy. Clinical examination revealed an inadequate zone of AG (tension test-positive) with either shallow vestibule or aberrant frenum attachment in all cases [Figure 1 and 2]. Clinical parameters recorded using UNC-15/WHO periodontal probe at base line and 9 months after procedure included probing pocket depth (PPD – distance from gingival margin to base of pocket), GR (distance from cementoenamel junction to gingival margin), width of AG (distance from base of pocket to mucogingival junction), and clinical attachment level (CAL – distance from cementoenamel junction to base of pocket), as shown in Tables 1–3. The procedure was well explained to the patient and informed consent was obtained for surgery.

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The surgical procedure included the bridge flap technique as introduced by Marggraf<sup>[2]</sup> and later on modified by Romanos.<sup>[3]</sup> The technique included an arch-shaped incision in the vestibule at approximately  $2 \times GR + 2$  mm from the gingival margin. An incision into the perisoteum was placed at its base and the bone was exposed so that scar formation could occur. A split-thickness flap was elevated in the apicocoronal direction by making a sulcular incision, connecting it with the first incision so that the whole bridge flap could be elevated and repositioned coronally to cover the denuded root surfaces. The repositioned flap was then pressed for 3 min and independent sling sutures were placed [Figure 3 and 4]. Coepak was applied on the operative area covering the exposed bone. Written post-operative instructions were given to the patients and they were prescribed analgesic (ibuprofen 400 mg twice daily) for

3 days. 0.2% chlorhexidine mouth rinse was instructed till 4 weeks after surgery. Sutures were removed 10 days after the surgical procedure and patients were asked to maintain meticulous oral hygiene. All surgical procedures were performed by the same clinician and both pre-operative and post-operative measurements were recorded by the same individual.

## Results

The data obtained [Table 4] was compared using the paired “t” test. For the purpose of analysis, Statistical Package for Social Sciences Version 15.0 was used. Results showed statistically significant root coverage and significant gain in AG and clinical attachment with average value of  $1.778 \pm 1.003$  mm,  $3.527 \pm 0.915$  mm, and  $1.945 \pm 0.265$  mm, respectively.



**Figure 1:** Pre-operative photograph showing insufficient width of attached gingiva, presence of diastema, pronounced labial inclination, and Miller's Class III recession on teeth 31 and 41



**Figure 2:** Pre-operative photograph showing recession on teeth 31 and 41 along with insufficient attached gingiva and high frenum attachment



**Figure 3:** Intra-operative photograph showing arc-shaped incision and bridge flap repositioned coronally with independent sling sutures



**Figure 4:** Intra-operative photograph showing arc-shaped incision and bridge flap repositioned coronally with independent sling sutures

**Table 1: Pre-operative (at base line )**

	Miller's Class	Tooth no.	GR (mm)	PPD (mm)	AG (mm)	CAL (mm)
Case 1	Class II	31	4.0	1.0	1.5	5.0
	Class II	41	4.0	1.0	1.5	5.0
Case 2	Class III	31	4.0	1.5	1.5	5.5
	Class III	41	3.5	1.5	1.5	5.0
Case 3	Class III	31	3.0	2.0	1.5	5.0
	Class II	32	2.0	2.0	2.0	4.0
	Class III	41	3.0	2.0	1.5	5.0
	Class II	42	1.5	2.0	2.5	3.5
Case 4	Class III	31	3.5	1.5	2.0	5.0
	Class II	41	1.5	2.0	2.5	3.0
	Class II	42	2.0	1.5	2.5	3.5
	Class I	31	2.0	1.0	1.5	3.0
Case 5	Class I	31	2.0	1.0	1.5	3.0
	Class II	41	4.0	1.0	1.0	5.0
Case 6	Class II	31	3.5	1.5	2.5	5.0
	Class II	41	5.0	2.0	2.0	7.0
Case 7	Class I	31	4.0	1.5	2.5	5.5
Case 8	Class III	31	4.0	1.5	1.0	5.5
	Class III	41	4.0	1.5	1.5	5.5

**Table 2: Post-operative (at 9 months )**

	Tooth no.	GR (mm)	PPD (mm)	AG (mm)	CAL (mm)
Case 1	31	1.0	1.0	5.5	2.5
	41	1.5	1.0	5.5	2.5
Case 2	31	2.5	1.0	5.0	3.5
	41	2.5	1.0	5.0	3.5
Case 3	31	2.0	1.5	5.0	3.5
	32	1.5	2.0	5.5	3.5
	41	1.0	2.0	7.0	3.0
	42	0.5	2.0	8.0	2.5
Case 4	31	2.5	1.5	4.0	4.0
	41	1.0	2.0	5.0	3.0
	42	1.5	1.5	4.5	3.0
Case 5	31	0.5	1.0	5.0	1.5
	41	1.0	1.0	4.5	2.0
Case 6	31	1.5	1.0	5.5	2.5
	41	1.5	1.5	5.5	3.0
Case 7	31	0.5	1.0	6.0	1.5
Case 8	31	2.0	1.0	4.5	3.0
	41	2.0	1.0	5.0	3.0

**Table 3: Change in pre- and post-operative values**

	Tooth no.	GR-1 (mm)	GR-2 (mm)	Change (mm)	%	AG-1 (mm)	AG-2 (mm)	Change (mm)
Case 1	31	4.0	1.0	3.0	75	1.5	5.5	4.0
	41	4.0	1.5	2.5	62.5	1.5	5.5	4.0
Case 2	31	4.0	2.5	1.5	37.5	1.5	5.0	3.5
	41	3.5	2.5	1.0	28.57	1.5	5.0	3.5
Case 3	31	3.0	2.0	1.0	33.3	1.5	5.0	3.5
	32	2.0	1.5	0.5	25	2.0	5.5	3.5
	41	3.0	1.0	2.0	66.7	1.5	7.0	5.5
	42	1.5	0.5	1.0	66.7	2.5	8.0	5.5
Case 4	31	3.5	2.5	1.5	42.8	2.0	4.0	2.0
	41	1.5	1.0	0.5	33.3	2.5	5.0	2.5
	42	2.0	1.5	0.5	25	2.5	4.5	2.0
Case 5	31	2.0	0.5	1.5	75	1.5	5.0	3.5
	41	4.0	1.0	3.0	75	1.0	4.5	2.5
Case 6	31	3.5	1.5	2.0	57	2.5	5.5	2.0
	41	5.0	1.5	3.5	70	2.0	5.5	3.5
Case 7	31	4.0	0.5	3.5	87.5	2.5	6.0	3.5
Case 8	31	4.0	2.0	2.0	50	1.0	4.5	3.5
	41	4.0	2.0	2.0	50	1.5	5.0	3.5

Highest gain in AG was 4.6 mm, whereas the least gain was 1.8 mm, and the highest recession coverage came to an average of 87.5%, whereas the least was 25%. Results also showed non-significant changes in periodontal PPD.

## Discussion

While reviewing the literature, we came across a number of articles addressing mucogingival problems and their surgical solutions. However, an unresolved controversy still exists in the literature regarding the adequate AG for periodontal health maintenance,<sup>[4]</sup> and the contemporary

opinion suggests that the regions with <2 mm AG and thin gingival tissue are at increased risk of GR even if it is possible to maintain the gingival health in the areas with insufficient or absent AG.<sup>[5]</sup> Hence, mucogingival therapy should be advocated for gingival augmentation and to create adequate vestibular depth in areas with insufficient AG.<sup>[5-8]</sup>

Contrary to the reports of Marggraff,<sup>[2]</sup> Romanos *et al.*,<sup>[3]</sup> and Vijaylaxmi *et al.*,<sup>[9]</sup> who all stressed very little on the gain of width of AG by this particular technique, we observed a surprising and highly statistically significant gain. The highest gain of AG width in our study was 4.6-times of the pre-



**Table 4: Comparative analysis of various clinical parameters**

	Pre (M1)		Post (M2)		M1-M2		"t"	"P"
	Mean	SD	Mean	SD	Mean	SD		
GR	3.250	1.033	1.472	0.675	1.778	1.003	7.518	<0.001
PPD	1.556	0.379	1.333	0.420	0.223	0.256	3.688	0.002
AG	1.806	0.518	5.333	0.939	3.527	0.915	-16.356	<0.001
CAL	4.778	1.018	2.833	0.686	1.945	0.265	7.345	<0.001



**Figure 5:** Post-operative photograph (9 months). Marked increase in width of the attached gingiva can be appreciated

operative, and the least was 1.8-times, with an average gain of 3.5 mm [Figure 5 and 6]. We selected our cases regardless of the etiology of GR mainly on the patients complaint of esthetics and hypersensitivity. But, on close survey of our cases selected, anatomical variations for GR, viz. high frenum pull, shallow vestibule, thin gingival tissue or insufficient width of AG, were present in one or the other patient as contributing factors for GR. By achieving such a significant gain in the apico-coronal dimension of AG, we at least could abolish the aforementioned contributing etiologic factors for GR, and the incidence of recurrent recession was also decreased considerably by the simultaneous extension of the vestibule. The mean percentage gain in CAL was around 41% in our study, which also re-asserts the gain in width of AG by this surgical endeavour. The mean percentage change in PPD from the mean pre-operative value had been only 14.3%, clinically not much reduction could have been possible as the cases selected were already scaled and root planed thoroughly.

The mean root coverage obtained in our study was 55% and, contrary to the study of Vijaylakshmi *et al.*<sup>9</sup> and Romanos *et al.*,<sup>[3]</sup> we could not achieve any 100% root coverage. The highest coverage obtained in our study accounts for 87.5%. This dissimilarity of our results could be because of us being more liberal in our case selections in terms of diastema presence, pronounced labial inclinations, shallow vestibule, or frenum pull at the same time. The least coverage attained in our study was 25% and, therefore, the range of root



**Figure 6:** Post-operative photograph (9 months)

coverage (25–87.5%) is similar to the range of root coverage obtained by any root coverage procedure. The minimum values of root coverage, i.e. 25%, in few cases could be due to the very thin gingiva present, which posed great difficulties in coronally repositioning the bridge flap that is a partial thickness flap. To overcome this difficulty, modifications such as combination of connective tissue grafts along with this bridge flap technique can be advocated. We kept our study cases limited to the lower anteriors to get unbiased results as well as to be able to treat multiple mucogingival problems at the same time. In terms of root coverage, it is highly important to have a proper case selection, e.g. presence of diastema, improper proximal contacts, thinness of gingival, or pronounced labial inclinations, which, otherwise, significantly lowers the outcome of root coverage. The results of our cases where open proximal contacts were present are contrary to the results shown by Vijaylakshmi *et al.*<sup>[9]</sup> Based on our results, we also recommend that a completely preserved interdental septum is a *conditio sine qua non* as advocated by Marggraf.<sup>[2]</sup>

The present case series presents a cost-effective single-step entity to correct multiple mucogingival problems at a time with less morbidity to donor tissue; however, lack of inclusion control groups are its limitation and, hence, further controlled randomized clinical trials are required.

## Conclusions

Several surgical techniques are described in the literature to correct mucogingival problems. The surgical endeavor, "Bridge

Flap Procedure,” gave a successful solution by attaining root coverage, increasing the width of AG, deepening the vestibule to a desired extent, and simultaneously correcting the problem of high frenum if present, in one step only, along with gain in CAL and reduction of PPD.

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