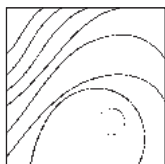


Connective Tissue Graft and Resin Glass Ionomer for the Treatment of Gingival Recession Associated with Noncarious Cervical Lesions: A Case Series



Mauro Pedrine Santamaría, DDS, MS, PhD*
Gláucia Maria Bovi Ambrosano, MS, PhD**
Marcio Zaffalon Casati, DDS, MS, PhD***
Francisco Humberto Nociti Júnior, DDS, MS, PhD****
Antônio Wilson Sallum, DDS, MS, PhD****
Enilson Antônio Sallum, DDS, MS, PhD****

This article describes the treatment of gingival recession associated with noncarious cervical lesions by a connective tissue graft in combination with a resin-modified glass-ionomer restoration (CTG + R). Eleven patients showing the association of recession and lesions were selected and treated by CTG + R. Bleeding on probing, probing depth, relative gingival recession, clinical attachment level, noncarious cervical lesion height, and dentin sensitivity were measured. The treatment provided statistically significant gains in clinical attachment level and shallow probing depths. The percentage of cervical lesion height covered was $74.0\% \pm 22.90\%$. It can be concluded that the presence of resin-modified glass-ionomer filling did not interfere with coverage achieved by the connective tissue graft. (Int J Periodontics Restorative Dent 2011;31:e57–e63.)

*Researcher, Department of Prosthodontics and Periodontics, Division of Periodontics, Piracicaba Dental School, University of Campinas–UNICAMP, São Paulo, Brazil.

**Professor, Department of Social Dentistry, Division of Biostatistics, Piracicaba Dental School, University of Campinas–UNICAMP, São Paulo, Brazil.

***Assistant Professor, Department of Prosthodontics and Periodontics, Division of Periodontics, Piracicaba Dental School, University of Campinas–UNICAMP, São Paulo, Brazil.

****Professor, Department of Prosthodontics and Periodontics, Division of Periodontics, Piracicaba Dental School, University of Campinas–UNICAMP, São Paulo, Brazil.

Correspondence to: Dr Mauro Pedrine Santamaría, Department of Periodontics and Prosthodontics, Piracicaba Dental School, University of Campinas–UNICAMP, Av. Limeira, 901, Areião, Piracicaba, São Paulo, Brazil 13414-903; fax: 55 19 2106 5301; email: maurosantamaria@gmail.com.

It has been recognized that gingival recession is often associated with cervical wear. Sangnes and Gjermo¹ reported that gingival recession and a wedge-shaped defect in the cervical area are often seen affecting the same tooth, while another report² demonstrated that no signs of cervical abrasion on the cemento-enamel junction (CEJ) were observed in approximately 50% of examined teeth showing gingival recession.

Noncarious cervical lesions simultaneously affect parts of the root and crown of the tooth, and, with their progression, the CEJ generally disappears. A new line is established coronal to the lost CEJ, representing the incisal border of the noncarious cervical lesion, and is often mistaken for the CEJ.² This situation leads to only partial coverage if a coronally advanced flap is performed alone.³

As shown previously,^{3,4} gingival recessions associated with noncarious cervical lesions can be treated successfully using glass-ionomer restorations combined with a coronally advanced flap. Improvements



Fig 1 Estimation of the CEJ using the method described by Zucchelli et al.² Black line = estimated CEJ; CLH = noncarious cervical lesion height; yellow = noncarious cervical lesion located on the root surface (CLH-R).

in the final esthetics and better resolution of dentin hypersensitivity have been observed following such treatment. Moreover, no interference in the amount of root coverage was observed. Little is known, however, about the best surgical approach for the treatment of gingival recession associated with restored noncarious cervical lesions. Thus, the aim of this study was to evaluate the 6-month outcomes of a connective tissue graft and resin glass-ionomer restoration for the treatment of gingival recession associated with a noncarious cervical lesion.

Method and materials

Eleven patients (five men, six women; age range, 24 to 58 years; mean age, 36.26 ± 9.2 years) were selected using the following eligibility criteria: All patients were nonsmokers,

were systemically and periodontally healthy, had no contraindication for periodontal surgery, had not taken medications known to interfere with periodontal tissue health and healing, presented one Miller Class I gingival recession associated with a noncarious cervical lesion in the maxillary canines or premolars, had a probing depth < 3 mm without bleeding on probing, had a width of keratinized tissue > 2 mm, and gave informed consent (CEP-UNICAMP 104/2005).

Initially, patients completed a plaque control program, which included oral hygiene instructions, with a nontraumatic brushing technique using a soft toothbrush. Patients were encouraged to avoid excessive consumption of acidic beverages or foods. When necessary, selective grinding to remove occlusal interferences, scaling and root planning, and crown polishing were performed.

The following parameters were recorded as previously described⁵: Full-mouth Visible Plaque Index⁶ (visible plaque at the site included in the study) (VPS); bleeding on probing at the site included in the study (BOP); probing depth (PD); relative gingival recession (RGR); relative clinical attachment level (CAL), as determined by $PD + RGR$; noncarious cervical lesion height (CLH); and height of the noncarious cervical lesion located on the root surface (CLH-R). The CEJ was estimated using the method described by Zucchelli et al.² The distance from the estimated CEJ to the incisal border of the tooth and RGR were measured using image analysis software. CLH-R was calculated by subtracting the distance from the estimated CEJ to the incisal border from the RGR. This parameter allowed the calculation of the percentage of root coverage (Fig 1). The subtraction of the noncarious cervical lesion height

on the root from the total cervical lesion height provided the amount of cervical lesion located on the crown (CLH-C). Keratinized tissue width (KTW), keratinized tissue thickness⁷ (KTT), and dentin sensitivity (DS) were also recorded. PD, RGR, CAL, DS, VPS, and BOP were measured at baseline, 45 days, and 2, 3, and 6 months after surgery. KTW and KTT were obtained at baseline and 6 months postoperative.

All sites were treated with restoration of the noncarious cervical lesion using resin glass-ionomer cement, a connective tissue graft, and a coronally advanced flap (Fig 2a). After local anesthesia, an intrasulcular incision was made at the buccal aspect of the involved tooth. Two horizontal incisions were made at right angles to the adjacent interdental papillae, 1 mm apical to the level of the coronal border of the noncarious cervical lesion, without interfering with the gingival margin of the neighboring teeth. Two oblique vertical incisions were extended beyond the mucogingival junction, and a trapezoidal mucoperiosteal flap was raised to the mucogingival junction (Figs 2b and 2c). Then, a split-thickness flap was extended apically, releasing the tension and favoring coronal positioning of the flap. Rubber dam was placed to isolate the operating field (Fig 2d), and restoration of the noncarious cervical lesion was performed using resin-modified glass-ionomer cement (Figs 2e and 2f) following the manufacturer's instructions. Afterward, the epithelium on the ad-

jacent papillae was stripped away, and the connective tissue graft was placed covering the full height of the restoration (Fig 2g). The flap was then positioned coronally and sutured (Fig 2h).

Patients were instructed to take analgesics and discontinue tooth-brushing around the surgical sites during the initial 30 days after surgery. During this period, plaque control was achieved using a 0.12% chlorhexidine solution twice a day. Sutures were removed after 7 days, and patients were enrolled in a periodontal maintenance program during the study period.

Descriptive statistics were expressed as mean \pm standard deviation. A significance level of .05 was adopted for all statistical comparisons.

Results

Healing was uneventful for all patients, and no patient was excluded from the study. Full-mouth Visible Plaque Index and Sulcus Bleeding Index scores were maintained below 20%, indicating a good standard of supragingival plaque control throughout the study period. The sites included in the study did not show bleeding on probing or visible plaque during the entire study period. Table 1 shows the mean initial and final values for PD, CAL, and RGR. After 6 months, the treatment produced a statistically significant reduction in RGR and a significant gain in CAL, but no change in PD was observed.

Mean CLH values were 2.77 ± 0.51 mm (range, 2.23 to 3.85 mm). After 6 months, mean RGR reduction was 2.05 ± 0.68 mm, and 74.00% $\pm 22.90\%$ of the CLH was covered by soft tissue. Four sites (36.36%) achieved complete CLH coverage. By estimating the original location of the CEJ,² it was possible to assess the amount of root affected by the noncarious cervical lesion. As a consequence, the mean value of root coverage could be calculated. The mean CLH was 2.77 ± 0.51 mm, but 2.09 ± 0.30 mm was located on the root, and 0.67 ± 0.23 mm was located on the crown. Therefore, 75.65% $\pm 12.19\%$ of the CLH extension was located on the root and 24.35% $\pm 12.19\%$ on the crown. Based on this calculation, the mean root coverage obtained with the treatment was 83.34% $\pm 16.32\%$, with 36.36% of subjects achieving complete CLH coverage (Table 2).

Within the present sample, 72.72% of subjects reported presence of DS at baseline. At 6 months after treatment, one (9.09%) subject reported persistence of this symptom. The reduction in DS was statistically significant ($P = .0001$). Both KTW and KTT showed statistically significant changes after treatment. KTW increased from 2.56 ± 1.27 mm to 3.67 ± 1.09 mm ($P = .002$) and KTT increased from 0.86 ± 0.20 mm to 1.82 ± 0.41 mm ($P = .00001$). Figure 2i shows the 6-month postoperative outcome.

Fig 2a Preoperative view.

Fig 2b Raised mucoperiosteal flap.

Fig 2c Lateral view of the cervical lesion showing a depth of 2 mm.

Fig 2d Isolation of the operating field by rubber dam.

Fig 2e Noncarious cervical lesion restoration using resin-modified glass ionomer.

Fig 2f View of the restoration out of isolation.

Fig 2g Connective tissue graft in position.

Fig 2h Flap sutured over the lesion.

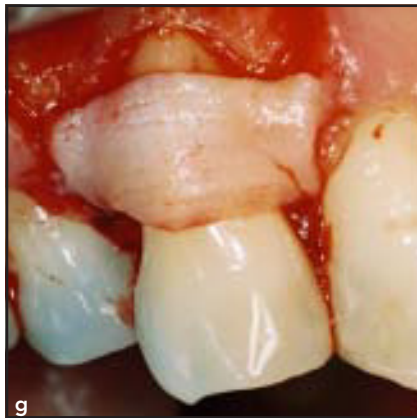


Table 1 Mean baseline and final evaluation measurements and mean changes for PD, RGR, and CAL (mm)			
	Baseline	Final	Change
PD	1.01 ± 0.44	1.28 ± 0.40	0.27 ± 0.60
RGR	11.40 ± 0.94	9.58 ± 0.88	1.81 ± 0.38*
CAL	12.41 ± 0.91	10.86 ± 0.86	1.55 ± 0.87*

PD = probing depth; RGR = relative gingival recession; CAL = clinical attachment level.
 *Statistically significant difference ($P \leq .05$, one-way analysis of variance).

Table 2 Mean CLH and percent soft tissue coverage	
CTG + R	
CLH	2.77 ± 0.51 mm
CLH-R	2.09 ± 0.30 mm
CLH-C	0.67 ± 0.23 mm
CLH coverage	74.00% ± 22.90%
% root coverage	83.34% ± 16.32%

CLH = noncarious cervical lesion height; CLH-R = noncarious cervical lesion height located on the root; CLH-C = noncarious cervical lesion height located on the crown.



Fig 2i Clinical outcome at 6 months.

Discussion

When gingival recession is associated with cervical wear, the selection of appropriate treatment becomes more difficult. The loss of the CEJ, caused by the development of a noncarious cervical lesion, demonstrates that both crown and root are affected by the lesion. A new line is established coronal to the original CEJ, representing the incisal border of the noncarious cervical lesion,

and is often mistaken for the CEJ.² This condition may lead to gingival recession associated with the noncarious cervical lesion, resulting in an unpredictable level of complete coverage following any periodontal plastic surgery. On the other hand, when the noncarious cervical lesion is treated by a restorative procedure only, the position of the gingival margin remains more apical because of the persistence of the gingival recession, which may lead to a

longer tooth and, consequently, to possible esthetic disharmony.

Previous reports^{3,4} have shown that the association of gingival recession and noncarious cervical lesions can be successively treated using a coronally advanced flap and different filling materials. The presence of the restoration did not affect the amount of coverage achieved by the coronally advanced flap, and the association of the restoration with periodontal surgery



could provide a good esthetic outcome. However, these reports have also shown that complete CLH coverage could not be achieved with a coronally advanced flap.^{3,5}

It has been suggested⁸ that the connective tissue graft technique may provide the highest percentage of mean root coverage and the least variability. Even though one review⁹ demonstrated that the connective tissue graft does not present a statistically significant difference in coverage when compared to the coronally advanced flap, the authors reinforced that the connective tissue graft is the most predictable technique for root coverage in most situations. However, the success of the connective tissue graft, when used in combination with a cervical restoration for the treatment of teeth simultaneously affected by gingival recession and noncarious cervical lesions, has not been evaluated extensively.

The observed change in the relative gingival recession after 6 months was 2.05 ± 0.68 mm, which represents $74.0\% \pm 22.90\%$ CLH coverage ($P < .001$). It is important to note that the CLH coverage reported in the present study should not be directly compared to other studies that included gingival recessions on intact roots. This comparison is not possible, since the noncarious cervical lesion simultaneously affects parts of the root and crown of the tooth, and, with its progression, the CEJ generally disappears. A new line is established coronal to the original CEJ, representing the incisal border of

the noncarious cervical lesion, and is often mistaken for the CEJ.² Thus, only the portion of the noncarious cervical lesion located on the root could be predictably covered by soft tissue after periodontal plastic surgery.

To explore the hypothesis that the portion of the noncarious cervical lesion that remained exposed was mainly composed by the crown portion of the lesion, an estimation of the position of the CEJ² was performed, which also allowed an estimation of the part of the cervical lesion height located on the root (CLH-R) and crown (CLH-C) and, as a consequence, an estimation of the real root coverage. Using this method, the present study demonstrated that CLH-R was $75.65\% \pm 12.19\%$ and CLH-C was $24.34\% \pm 12.19\%$ of the total CLH and that the mean root coverage (CLH-R coverage) was $83.34\% \pm 16.32\%$. This value indicates that the presence of the resin glass-ionomer cement filling the noncarious cervical lesion did not interfere with the soft tissue coverage obtained by the connective tissue graft. In addition, this value is similar to that obtained when using a coronally advanced flap.⁵

Gain of CAL was 1.86 ± 0.99 mm after treatment, which was statistically significant, and the final mean PD did not change significantly when compared to baseline values. No site showed BOP during the observation period. Some studies demonstrated that the presence of restoration margins close to the gingival margin or within the crevicular space may cause gingival inflam-

mation.¹⁰ The results of the present study are not in agreement with this statement, since the amount of soft tissue coverage achieved in the present study led to approximately 74% of the extension of the restorations in a subgingival position, but without BOP or signs of gingival inflammation during the study period. The studies by Dragoo^{11,12} and Alkan et al¹³ demonstrated that periodontal health was maintained when resin-modified glass ionomer was used for subgingival or transgingival restorations. The biocompatibility of the material, added to the fact that the patients were followed monthly for prophylaxis, plaque control, and oral hygiene instructions, may help to explain the gingival health observed during the study. In addition, flap elevation allowed proper isolation of the operative field, and a well-finished filling was achieved, which might have facilitated plaque control. Similar results were obtained by previous reports.³⁻⁵

Clinically, the sites included in the study did not present statistically significant changes in PD after treatment, showing shallow sulci after the observation period. Despite the lack of histologic evaluations to assess the healing pattern achieved by the combined procedure, it can be considered that connective tissue and epithelium adherence to resin-ionomer material might have occurred.¹² However, histologic studies are strongly recommended to confirm this hypothesis.

In the present study, patients were asked about the presence of dentin hypersensitivity before

and after treatment, without application of any thermal or tactile stimuli. The absence of stimuli application would demonstrate the patients' self-perceptions concerning this symptom and would show the success of the therapy according to the patients' viewpoints.⁹ The present study showed a statistically significant reduction in DS between baseline and subsequent observation periods. Reductions in this symptom may be explained by the presence of the filling, which sealed the dentin tubules exposed by cervical wear.

Conclusions

Within the limits of the present study, it can be concluded that the presence of the resin-modified glass-ionomer cement did not interfere with the coverage achieved with the connective tissue graft. However, further studies with larger samples are strongly recommended to confirm these results, and longitudinal observation is also necessary to evaluate the stability of the results and establish the long-term success of this combined approach. Other restorative materials and surgical techniques should be tested to achieve the best combination to treat this particular lesion.

References

1. Sangnes G, Gjermo P. Prevalence of oral soft and hard tissue lesions related to mechanical toothcleansing procedures. *Community Dent Oral Epidemiol* 1976;4:77–83.
2. Zucchelli G, Testori T, De Sanctis M. Clinical and anatomical factors limiting treatment outcomes of gingival recession: A new method to predetermine the line of root coverage. *J Periodontol* 2006;77:714–721.
3. Santamaria MP, Suaid FF, Nociti FH Jr, Casati MZ, Sallum AW, Sallum EA. Periodontal surgery and glass ionomer restoration in the treatment of gingival recession associated with a non-carious cervical lesion: Report of three cases. *J Periodontol* 2007;78:1146–1153.
4. Lucchesi JA, Santos VR, Amaral CM, Peruzzo DC, Duarte PM. Coronally positioned flap for treatment of restored root surfaces: A 6-month clinical evaluation. *J Periodontol* 2007;78:615–623.
5. Santamaria MP, Suaid FF, Casati MZ, Nociti FH Jr, Sallum AW, Sallum EA. Coronally positioned flap plus resin-modified glass ionomer restoration for the treatment of gingival recession associated with non-carious cervical lesions: A randomized controlled clinical trial. *J Periodontol* 2008;79:621–628.
6. Ainamo J, Bay I. Problems and proposals for recording gingivitis and plaque. *Int Dent J* 1975;25:229–235.
7. de Queiroz Côrtes A, Sallum AW, Casati MZ, Nociti FH Jr, Sallum EA. A two-year prospective study of coronally positioned flap with or without acellular dermal matrix graft. *J Clin Periodontol* 2006;33:683–689.
8. Raetzke PB. Covering localized areas of root exposure employing the "envelope" technique. *J Periodontol* 1985;56:397–402.
9. Rocuzzo M, Bunino M, Needleman I, Sanz M. Periodontal plastic surgery for treatment of localized gingival recessions: A systematic review. *J Clin Periodontol* 2002;29(suppl 3):178–194.
10. Larato DC. Influence of a composite resin restoration on the gingiva. *J Prosthet Dent* 1972;28:402–404.
11. Dragoo MR. Resin-ionomer and hybrid-ionomer cements: Part I. Comparison of three materials for the treatment of subgingival root lesions. *Int J Periodontics Restorative Dent* 1996;16:594–601.
12. Dragoo MR. Resin-ionomer and hybrid-ionomer cements: Part II, human clinical and histologic wound healing responses in specific periodontal lesions. *Int J Periodontics Restorative Dent* 1997;17:75–87.
13. Alkan A, Keskiner I, Yuzbasioglu E. Connective tissue grafting on resin ionomer in localized gingival recession. *J Periodontol* 2006;77:1446–1451.