

# Preservation of the Interdental Papilla and Prevention of Alveolar Bone Collapse After Extraction of an Anterior Tooth



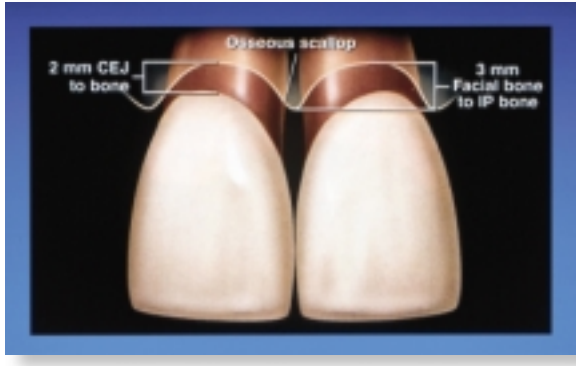
by  
Khalil S. Saghezchi, D.D.S.

*Dr. Khalil Saghezchi graduated in 1988 from the University of the Pacific and is an Accredited Member of the American Academy of Cosmetic Dentistry. He also is an Adjunct Professor of the University of the Pacific and practices cosmetic and restorative dentistry in Santa Clara, California.*

Soft and hard tissue recession after the removal of an anterior tooth is one of the most challenging issues in a patient's treatment plan.<sup>1</sup> Interproximal tissue preservation and the prevention of alveolar bone collapse have never been as desirable as they are in today's restorative dentistry.

One major concern of the restorative team in cosmetic dentistry (especially in the esthetic zone) is the preservation of the interdental papilla.<sup>2</sup> Examination of the edentulous ridge shows no papillary form. To understand the role of the dentition in the creation of the interdental papilla, it is essential to review the normal anatomy of the tooth and the surrounding bone socket, and the relationship of the gingival contour to the underlying osseous scallop. In a healthy individual, the contour of the alveolar bone follows the outline of the cemento-enamel junction (CEJ). Clinical research has shown that on the facial bone, the crest of the alveolar ridge is 2 mm apical to the CEJ. The distance from the facial bone to the interproximal bone is 3 mm to 3.5 mm in height<sup>3,4</sup> (Fig 1).

The presence of the osseous scallop (positive bone architecture) creates a degree of papillary form. Research has shown an average distance of gingival scallop from the crest of the alveolar bone to free gingival margin facially to 3 mm in height. However, the average distance from the free gingival margin on the facial bone to the interproximal tissue is 4.5 to 5.5 mm. This means that there is 1.5 to 2.5 mm of increased gingival tissue height interproximally. Therefore, there exists some other factor besides the underlying osseous contour that accounts for this increased tissue height.<sup>5</sup>



**Figure 1: Demonstration of gingival contour to the underlying osseous scallop.**



**Figure 2: Preoperative view of root canal treated tooth #8.**

The biological width, described in most of the literature, consists of the connective tissue attachment and epithelial attachment, which on average is about 2 mm. It appears that the presence of the adjacent tooth attachment and the size of the gingival embrasure formed by these teeth are responsible for the presence and height of the papilla.<sup>6</sup>

The critical point in preserving the tissue height following an extraction is preserving the socket size, shape, and the space of the gingival tissue. When the tooth is extracted, the interproximal papilla recedes above the alveolar bone. This recession is almost 3 mm after the extraction. Not only does the tissue recede, but the buccal bone collapses as well.<sup>7</sup>

To prevent the recession of the interproximal tissue and buccal bone collapse after the extraction of an anterior tooth, the extracted socket must be preserved in the same shape and location as the pre-extracted shape. There are several different treatment methods to preserve the osseous scallop and interproximal tissue: implant, conventional bridge, and bonded bridge.

No matter the type of treatment, the provisionalizing of the extraction

site is the most important factor in preserving the interproximal tissue and osseous form in the same condition as the pre-extraction form. Pressure from the temporary and adjacent teeth helps to prevent the papilla from being lost.<sup>8</sup>

To completely realize how this pressure could hold and create (preserve) the papilla from flattening, we have been experimenting with the creation of a normal interproximal papilla after closing the diastema of the two maxillary central teeth.

This article addresses the final restoration 4 years later. Evaluations were made of cases with and without bone grafting of the sockets after extraction. Based on the clinical observations, if the case qualifies for this procedure it makes no difference in the final result. However, in some periodontally compromised situations we may need to use bone grafting.<sup>9</sup>

### CASE HISTORY 1

A female patient over 40 years old was referred for treatment of an unsuccessful root canal on tooth #8. After clinical evaluation and consultation with the endodontist, the diagnosis was a possible root fracture. The treat-

ment of choice was extracting tooth #8 and replacing it with a conventional three-unit bridge. Implants were ruled out due to the patient's lack of interest.

---

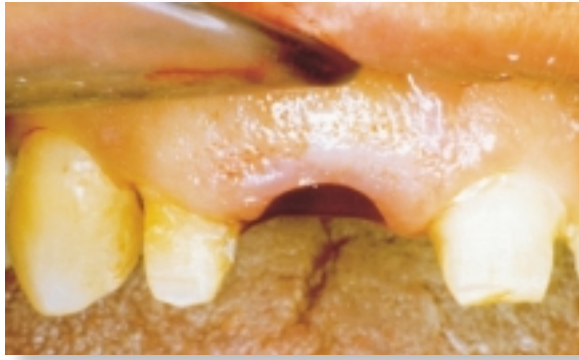
*In a healthy individual, the contour of the alveolar bone follows the outline of the cemento-enamel junction.*

---

Before the failed tooth was extracted, the existing tissue level was evaluated. Hard and soft tissue heights were in acceptable levels. Bone grafting and connective tissue build-up was not required (Fig 2). Presence of adequate facial and interproximal bone with ideal size and contour is essential in the final results, using the technique described below.

### TECHNIQUE

One of the most important factors in maintaining papillary height is making a successful temporary bridge. Before starting the treatment plan, alginate impressions were taken to fabricate study models. Study models were then sent to a laboratory for fabrication of the temporary bridge. A second option would be to make the temporary yourself. In order to make



**Figure 3:** View of socket immediately after extraction of teeth.



**Figure 4:** Healed socket, 8 weeks after extraction.



**Figure 5:** Final restoration of conventional bridge.



**Figure 6:** Preoperative view of palatall erupted canine.

the temporary bridge, the study models could be used as a template for the fabrication of a press-formed splint. An edentulous ridge is then created where the tooth to be removed is ground down to the ideal pontic shape and depth. This model is utilized to create the temporary bridge, which could then be relined on the patient during the procedure.

The second critical factor with this technique is the extraction of the failed tooth. Prior to the extraction, the adjacent teeth were prepared with the margins circumferentially positioned approximately 1 mm above the gum tissue to prevent any injury to the tissue. Preparation of the abutments prior to the extraction provided easy access for the surgery and prevented excess bleeding at the time of the

preparation. The extraction began by very carefully separating delicate tissue from the lingual approach, so as not to cause any tissue injury. Forceps were the only instruments used to extract the tooth, with a rotation movement. Buccal and lingual plates were not compressed in order to preserve the shape of the extraction socket. The socket was gently irrigated to clean and remove any foreign debris (Fig 3).

Next, the temporary bridge was relined and tried on the prepared teeth. The gingival third of the pontic was over-extended to fill the empty socket by about 3 mm. The reline material was left in the socket to maintain the natural shape of the extracted tooth buccal-lingually and mesiodistally. It is important to remove the temporary before it completely sets,

and to thoroughly remove excess material. The temporary bridge was completely polished and modified to adapt to the shape of the socket. During the try-in, the temporary should show slight pressure on the tissue, which results in prevention of tissue collapse.

The temporary bridge was cemented with Temp-Bond (Kerr; Orange, CA) cement, and all the excess cement was removed. The patient was instructed to return in 48 hours for removal of the temporary and evaluation of the extraction socket for proper healing. After evaluation, the temporary was recemented and the patient received oral hygiene instructions.

Four weeks after surgery, the temporary was removed again and the pontic was shortened from 3 mm to 1.5 mm



**Figure 7: View of extraction.**



**Figure 8: Temporary bridge shows bullet-shaped pontic.**



**Figure 9: View of healed socket, 6 weeks after extraction.**



**Figure 10: Final restoration.**

below the tissue to facilitate the patient's ability to floss. It was estimated that complete healing of the tissue would take 8 to 10 weeks.

After 8 weeks, the temporary bridge was removed; the socket had healed in excellent condition (Fig 4). (Please note that there is always some recession of the tissue to a certain extent.) Gingival height was trimmed on the abutment teeth sites with an ND:YAG (American Dental Technology; Corpus Christi, TX) laser (electrosurgery also can be used) in order to match the pontic tissue contour. The patient was then scheduled for final preparations of the abutment teeth 4 weeks after laser surgery. Due to the variability in healing times for each patient, the final impression may be taken anytime from 3 to 4 months

after extraction. In this case, the final impression for the final restoration was taken 4 months after the extraction (Fig 5).

#### LAB INSTRUCTIONS

Lab communication is a pivotal part of this technique. The lab should be completely clear about the instructions on how the pontic should be fabricated (by filling the socket site in the same manner as the natural tooth and making sure that it applies the correct amount of pressure to preserve the proximal tissue).

#### CASE HISTORY II

This patient was a 40-year old male who complained about his canine (tooth #11), which was palatally

erupted (Fig 6). The patient did not want to go through orthodontic treatment; he was looking for a quick, simple way to correct the unpleasant appearance of his canine. After several consultations, the following treatment options were presented: implant, conventional bridge, and metal-free bridge.

After he weighed the advantages and disadvantages of each option, the patient decided to have the canine extracted and replaced with a metal-free bridge. After the patient's bone architecture and soft tissue were evaluated, he was scheduled to have the extraction performed by the oral surgeon (Fig 7)

As described in the first case history and after fabrication of the temporary bridge from a study model, the

*continued on page 70*

oral surgeon was instructed to extract tooth #11. Tooth #12 was prepared for MOD Onlay (Jeneric/Pentron; Wallingford, CT) and tooth #10 was prepared for lingually wrapped veneer. We were able to have the socket tissue aligned with the two abutment teeth after the extraction. The prefabricated temporary bridge was relined at the socket area to fill in the socket more buccally (Fig 8).

---

**No matter the type of treatment, the provisionalizing of the extraction site is the most important factor in preserving the interproximal tissue and osseous form in the same condition as the pre-extraction form.**

---

As previously mentioned, one of the critical points in addition to the extraction is the pontic's size and shape. After 4 weeks, the temporary bridge is removed and the ND: YAG (American Dental Technology) laser is used to keep the extraction site with interproximal papilla intact. After 6 weeks, the socket was healed (Fig 9).

The abutment tooth (#12 MOD Onlay) was prepared with a mesial box so that it would have a stronger connection between the abutment and the pontic. The material used for this case

was a sculpture with reinforced fiber. After taking the impression, precise instructions were given to the lab technician to make sure that the apical embrasure covered the interproximal tissue. As mentioned earlier, the apical portion of the pontic should be 1 mm longer to fill in the area of the healed socket.

### CEMENTATION

The cementation of the metal-free bridge was the same as bonded restoration based on manufacturing recommendations<sup>10</sup> (Fig 10).

### CONCLUSION

Esthetics is the most difficult problem for restorative cosmetic dentists when replacing a single maxillary extracted anterior tooth. This article described a technique to maintain the height of the interproximal tissue and preserve the collapse of underlying facial alveolar bone. This technique can be helpful for immediate implant placement with a temporary bonding bridge. The figures demonstrate the different patients' outcomes after extractions. A 4-year follow-up in the first case indicates that the papillary height is virtually unchanged. *AB*

### REFERENCES

1. Abram SL. Augmentation of the deformed residual edentulous ridge for fixed prosthesis. *Compend Contin. Educ Dent* 1(3): 205-213, 1980.
2. Kois J. Altering gingiva levels. The restorative connection, Part I: Biological variables. *J Esthet Dent* 6:3-9, 1994.
3. Spears F. Maintenance interdental papilla following anterior tooth removal. *Pract Periodont Aesthetic Dentistry* 11(1):1-2, 1999.
4. Becker W, Ochsenbein T, Becker L. Alveolar bone anatomic profiles as measured from dry skulls. *J Clin Periodontol* 24(10):727-731, 1997.
5. Tamow DP, Magner AW, Fletcher P. The effect of distance from the contact point to the crest of the bone on the presence or absence of the interproximal dental papilla. *J Periodontol* 63(12):995-996, 1992.
6. Sanavi F, Wesgold AS, Rose LF. Biologic width and its relation to periodontal biotypes. *J Esthetic Dent* 10(3):157-163, 1998.
7. Abrams H, Kopyck RA, Kaplan AL. Incidence of anterior ridge deformities in partially edentulous patients. *J Prosth Dent* 57(2):191-194, 1987.
8. Wohlr PS. Single-tooth replacement in the aesthetic zone with immediate provisionalization: Fourteen consecutive care reports. *Pract Periodont Aesthetic Dent* 10(9):1107-1114, 1998.
9. Salama H, Salama M, Garber D, et al. Developing optimal perio-implant papilla within the aesthetic zone: Guided soft tissue augmentation. *J Aesthetic Dent* 7(3):125-129, 1995.
10. Baghi N, Knight GT, Berry TG. Comparing two methods of moisture control in bonding to enamel: A clinical study. *Oper Dent* 16(4): 130-135, 1991.



## CALL FOR MANUSCRIPTS

*The Journal of Cosmetic Dentistry* wants to provide its readership with more clinical research articles. Whether you're a private practitioner, a university-based teacher and scientist, or a laboratory technician, we encourage you to put esthetic techniques and materials to the test. We want to see the results of your research! We also welcome case reports and articles relating to practice development.

*The Journal of Cosmetic Dentistry* is a peer-reviewed publication. Unlike some scientific journals, we publish color illustrations at no cost to the author. At this time, *The Journal of Cosmetic Dentistry* also offers a relatively short interval between manuscript submission and publication of accepted articles, allowing our authors to get their work into print rapidly.

Please see the *GUIDELINES* for manuscript submission (page 81) for style specifications. Submit your manuscripts to:

*The Journal of Cosmetic Dentistry*  
AACD Executive Office  
2810 Walton Commons West, Suite 200  
Madison, WI 53718

