

**Guidelines for Esthetic Restorative Options and Implant Site  
Enhancement Using Orthodontic Extrusion**

**by**

**Maurice A. Salama, DMD**

**Henry Salama, DMD**

**David A. Garber, DMD**

**1218 West Paces Ferry Rd., Suite 200**

**Atlanta, GA 30327**

**Phone: 404-261-4941**

**Fax: 404-261-4946**

**E-mail: [goldsteingarber@goldsteingarber.com](mailto:goldsteingarber@goldsteingarber.com)**

The patient with hopeless, fractured or missing teeth within the esthetic zone has posed a tremendous challenge for today's dentist. This article will discuss "diagnostic indicators" involved in evaluating questionable teeth or edentulous spans prior to treatment planning, as well as the potential adjunctive role of orthodontics for the development of an esthetic restorative recipient site. <sup>^</sup>**Fig.1** In particular, a review of a technique that involves the utilization of orthodontic extrusion in combination with atraumatic extraction and immediate implant replacement utilizing a tapered implant system will be highlighted.

One of the prime considerations in deciding on tooth replacement procedures in the anterior region has been a lack of predictability in constructing an esthetic restoration, especially when selecting implants as an option. Most dentists have limited guidance in the evaluation and then selection of the appropriate restorative options in the "Esthetic Zone". With that in mind, recent publications have focused on the diagnostic evaluation of a site prior to selecting a particular restorative option for tooth replacement (chart). This selection criteria is based upon a thorough evaluation of the alveolar bone surrounding the site, especially the interproximal bone, which is the key to individual tooth form and esthetics. <sup>^</sup>**Fig. 2 a, b, & c**

One of the primary reasons for failure in this region has been ineffective or missing "diagnostic indicators" that make esthetic tooth replacement selection of a site unpredictable. In an attempt to simplify the diagnostic process, we choose to define future restorative sites into:

1. existing edentulous spans, "Delayed Sites" and
2. hopeless teeth prior to planned extractions, "Immediate Sites".

During the treatment of a previously extracted tooth in an edentulous span "Delayed Site", the evaluation process must consist of bone sounding of the interproximal peaks of bone as well as the location of the labial plate prior to selection of the appropriate restoration. <sup>^</sup> **Fig. 3 a**

**& b** As we know from Tarnow<sup>1</sup> and Kois<sup>2</sup>, as well as Salama, Salama & Garber, location of the interproximal peak of bone is extremely important in predicting whether or not interproximal soft tissue levels will be optimal around subsequent restorations. Previous articles have utilized the interproximal peak of bone directly in the middle of the contact area to suggest the predictability of papilla around dental implants. Salama & co-workers<sup>3</sup> have suggested that in fact it is far more important to probe the “adjacent” site next to the proposed implant, as it has been revealed to be the dominant area in predicting the post-operative location of the interproximal soft tissue levels. Therefore, in an edentulous area, probing of the interproximal peaks of bone on the adjacent teeth, implants or pontic areas should help to suggest the appropriate selection of a proposed restoration. Based upon our clinical data (see chart), we feel that these pre-operative bone sounding measurements should aid the dentist in selecting the best restorative option that corresponds to the surrounding bony anatomy of the individual patient.

**Parameters for Predictable Papillae\***

Class	Restorative Environment	Proximity Limitation	Vertical Soft-Tissue Limitations	
			Mean	Range
1	Tooth-Tooth	1		4.5 to 5mm
2	Tooth-Pontic	N/A	6.75	4 to 9 mm
3	Pontic-Pontic	N/A	6.5	5 to 9 mm
4	Tooth-Implant	1.5 mm	6.5	4 to 9 mm
5	Implant-Pontic	N/A	5.75	5 to 9 mm
6	Implant-Implant	3 mm	4.5	4 to 7 mm

\*Cumulative data of two test groups: (A) 37 patients with single and multiple implants in the maxillary anterior region, and (B) 11 patients who received conventional anterior fixed bridgework with pontics. Vertical soft-tissue depth was measured interproximally immediately adjacent to the implants, pontics, and teeth (Salama H, Garber DA, Salama MA, Presented at the Academy of Periodontology Annual Meeting, Hawaii 2000, General Session).

We believe this information to be the most important aspect in developing esthetics, since most of the problems we incur are developed due to poor diagnostics, and not from lack of technical expertise.

In treating teeth that are slated for extraction; “Immediate Sites”, bone sounding is an important aspect of the diagnostic phase. ^Fig. 4 a, b & c This allows us to evaluate the site,<sup>4</sup> and then if inadequate, we can choose to alter the site by means of orthodontics. In an area of poor soft tissue levels, recession or missing papillae with inadequate interproximal peaks of bone; orthodontic tooth movement allows for a simplified non-surgical approach to enhancing the site

prior to extraction and immediate implant placement. ^ **Fig. 5 a** A fractured central incisor within the “Esthetic Zone” poses a challenge to the dental team trying to recreate form and function.

This “orthodontic augmentation” technique utilizes the remaining attachment apparatus around the hopeless tooth by providing orthodontic tension on the periodontal ligament to manipulate the attachment apparatus in a vertical direction thereby bringing down the bone and soft tissue prior to extraction. ^ **Fig. 6a** This technique generally requires approximately 8-12 weeks of orthodontic extrusion followed by 4-6 weeks of stabilization. The level of orthodontic forces applied are light, approximately 80-120 grams, and it is important that the teeth are inflammation free, with no periodontal or periapical pathology present. Following stabilization, extraction and immediate implant placement is suggested. ^ **Fig. 6 b & c** An extraction site classification and this orthodontic technique has already been documented in a previous publication in the International Journal of Perio and Restorative Dentistry in September 1993.

The authors suggest approximately 20-25% over-correction of a site prior to extraction and immediate implant placement to account for possible recession and shrinkage of the hard and soft tissues following surgery. ^ **Fig. 7 a, b & c** Following atraumatic extraction, it is then necessary to once again re-evaluate the site utilizing the bone sounding techniques described earlier. Selection of the appropriate implant diameters, shape as well as thread design then becomes paramount in managing the implant site. A tapered implant system with different anatomic diameters allows for a true anatomic reconstruction beginning at the neck of the implant, ^**Fig. 8** as well as to allow for a better engagement of the tapered implant to the tapered extraction site. In addition, this allows for atraumatic surgical placement, in many cases without raising a flap, to avoid stripping of the periosteum and compromising the vascularity to the buccal plate. Utilization of this technique enables the practitioner a shorter, simplified and more

efficient approach to management of tooth replacement procedures in the anterior region.

Dentists have been utilizing this technique since 1996, with the results being comparable to classic one-stage implant techniques. **Fig. 9, 10**

Once orthodontics has optimized the site, and overcorrected the hard and soft tissue dimensions, teeth are extracted utilizing periostomes in an atraumatic method, engaging the periodontal ligament space, pushing apically to slowly tear those fibers and release the tooth without destruction or pressure of standard elevators to the surrounding socket and bony walls. **Fig. 11.**

Once the tooth is extracted, the extraction site is evaluated both internally and externally utilizing bone sounding. **Fig. 12** In the absence of any fenestrations and then based on the mesial-distal diameter of the extraction socket, an appropriate anatomically shaped diameter implant is selected in order to engage the mesial-distal walls of the socket. **Fig. 13** The authors choose to utilize custom anatomic shaped healing abutments fabricated chair side with composite resin when necessary to maintain or condition the soft tissue during the osseointegration phase of healing. **Fig. 14 a, b & c.** Careful attention is placed on trying to assure that the implant is placed slightly to the palatal in order to allow for a screw access that promotes the utilization of esthetic ceramic abutment systems or opacious porcelain to be baked onto a custom abutment in order to hide the metallic bluish color of the implant components showing through the thin gingiva that sometimes becomes problematic in terms of achieving esthetic success. **Fig. 15 a, b, c, d, & e.**

In summary, selection of the appropriate restoration when planning for tooth replacement in the esthetic zone is exceptionally challenging. The author's suggest that preoperative diagnostic evaluation of the site utilizing bone sounding and x-ray evaluation will lead the practitioner to choose the most appropriate restorative procedure and most predictable esthetic

result. When evaluating a deficient site prior to extraction, utilization of adjunctive orthodontic extrusion to manipulate the surrounding attachment apparatus of the tooth prior to extraction and implant placement is extremely helpful. This technique allows for utilization of the patient's own bone and soft tissue in a non-surgical approach to enhance the implant site and to provide for an atraumatic extraction with immediate implant placement utilizing a tapered implant system. This allows for one surgical phase, and in many cases can be managed without the reflection of a surgical flap, which allows for expeditious healing, as well as predictable soft tissue support and contours for the final restorative phase. In addition, this incisionless implant placement technique allows for maintenance of the vascularity to the very critical labial plate of bone, and minimizes the potential for postoperative soft tissue recession.

References:

1. Tarnow DP, Magner AW, Fletcher P: The effect of distance from the contact point to the crest of bone on the presence or absence of the interproximal dental papilla. *J Periodontol* 63(12):995-996, 1992.
2. Kois J: Altering gingival levels: the restorative connection. Part I. Biologic variables. *J Esthet Dent* 6:3-9, 1994.
3. Salama H, Salama MA, Garber DA, Adar P. " The Interproximal Height Of Bone: A Guidepost To Predictable Aesthetic Strategies And Soft Tissue Contours In Anterior Tooth Replacement. *Practs Periodont Aesthet Dent* 10(9): 1131-1142, 1998.
4. Salama H, Salama MA. "The Role of Orthodontic Extrusive Remodeling in the Enhancement of Hard and Soft Tissues Prior to Implant Placement: A Systematic Approach to The Management of Extraction Site Defects". *Int. Journal of Perio & Rest Dentistry*, 13(4): 313-334, 1993.