Advanced Techniques for Diastema Closure
A Microscopic Perspective

In dentistry, much of what we do and read is anecdotally driven. Additionally, most clinical assessments over the past century were done with little or no magnification, meaning they were based on incomplete visual information. Our opinions have been shaped by decades of clinical studies about restoration failures, marginal integrity, tissue health, and many other parameters. It seems that our house of dental decision-making has been built on sand.

Today, a small but growing number of dentists are routinely operating with high magnification levels. Once a clinician begins his or her journey using advanced magnification, that clinician may begin to reinvent many procedures (Figures 1 and 2). Users of advanced magnification also may find themselves pressed to problem solve on the fly as they encounter visual cues that are new to them, and neither the problem nor the solution is addressed in mainstream dental publications. This article will discuss how, when using magnification, some clinicians noted the benefits of a rounded marginal profile. A new anatomic matrix system that this author has developed (Bioclear) and its use with the Injection Molded Composite technique will be detailed.

Magnification provides a squared, not linear, relationship between powers of magnification and “picture elements” or “pixels” of information. In other words, clinicians working at 3.5x see 10 times more visual information, and at 10x clinicians see 100 times more than with the naked eye. If clinicians move to 25x for brief periods of observation throughout the clinical day, they will see 625 times more than with the naked eye (Table 1).

**Ethics and Diastema Closure**

Many esthetic procedures can improve the structural integrity of the tooth and also facilitate better health of the surrounding gingiva. Diastema closure, at least in the

<table>
<thead>
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<th>Table 1—Magnification and Visual Information</th>
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<td><strong>Magnification</strong></td>
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<td><strong>Information Content</strong></td>
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The techniques described in the article are the intellectual property of the author and can be used without charge by permission. Further information and hands-on courses are available from the author.
anterior sextant, does not give either of these secondary benefits. Sadly, the esthetic diastema closure often results in significant compromises in the root–crown architecture, and increased plaque retention with subsequent deterioration in periodontal health. Increased caries activity often follows. Any discrepancy greater than 50 µm will cause untoward tissue response.\(^2\) When using advanced magnification, clinicians found that a bulbous contour is actually far less detrimental than other often ignored and clinically unseen factors.\(^4\) To “do no harm” performing elective diastema closure, clinicians must elevate their game.

### Table 2—Microscopic Protocol for Margin Evaluation of Porcelain or Composite

<table>
<thead>
<tr>
<th>(x) Sub</th>
<th>Plus</th>
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<tbody>
<tr>
<td>(y) Undercontoured Emergence Profile</td>
<td>Rounded Emergence Profile</td>
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<tr>
<td>(z) Short</td>
<td>Long</td>
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\(x\) **Sub** is an underhang (shelf of tooth structure)  
**Plus** is an overhang (shelf of restorative material)  
(y) **Undercontoured Emergence Profile** is concave at the enamel and cementum intersection  
**Rounded Emergence Profile** is convex, causing a “potbelly” effect, at the enamel and cementum intersection  
(z) **Short** occlusal–gingival line  
**Long** occlusal–gingival line

Ideally, a restoration margin should be centered along the 3 axes (\(\leftrightarrow\)).

### Table 3—Parameters for Maximizing Total Potential Tissue Health

- No residual cement or calculus apical to finish lines  
- No root roughness from errant bur movements  
- No microroughness or porosities of porcelain or composite  
- No microleakage

Not avoiding these parameters can create an excessive bioburden, compounding any negative alignment on the axes in Table 2.


resulting in chronic tissue inflammation. Table 3 lists the parameters to be avoided because they will “tip the scale” and create an excessive bioburden, compounding any negative factors from a poorly constructed margin junction.

### Extreme Diastema Closure

When patients ask that large diastemas be closed, alternative choices should always be discussed; however, patients will sometimes choose the most expedient option, such as direct composite. When faced with this challenge, clinicians have limited options:

**Option 1—No Matrix:** In the severe diastema case featured in this article, it appears that the previous clinician used the papilla as the gingival matrix. This resulted in a good esthetic space closure, but a biologically horrific contour (Case Photos 1 through 4). A sharp 90° angle combined with a lumpy and porous surface created a poor environment for soft-tissue health. Note the torrent of blood visible as the removal of old composite is performed (Case Photo 5).

**Option 2—With Matrix, With Wedge:** The problems with traditional clear mylar strips are that they are flat and require wedging, do not conform to the tooth, and are nearly impossible to maintain deep in the sulcus. The result is often an esthetic compromise. Holding all 4 ends of the strips while simultaneously light-curing is always a challenge (Figures 3 through 5).

**Option 3—With Matrix, Without Wedge:** This approach can yield the worst of both worlds, incomplete space closure and gingival overhang,

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\(^2\) Sub Plus
\(^3\) Undercontoured Emerging Profile
\(^4\) Short Long

(x) Sub
(y) Undercontoured
(z) Short

Option 4—Bioclear Matrix System and Injection Molded Composite technique: With this technique, the Bioclear matrices intimately adapt to the gingival margins and duplicate full rounded contours (Figure 6).

1. Use the total-etch technique on the preparation.
2. Place a lightly filled bonding resin, such as OptiBond Solo Plus (Kerr Corporation).
3. Inject a flowable composite (Figure 7).
4. Inject a paste composite (Figure 8).
5. Light-cure all 3 resins together for a seamless filling (Figures 9 and 10).

Case Report

The featured case demonstrates retreatment of a classic iatrogenic diastema closure. A 29-year-old woman...
reported with chief complaints of oral malodor, bleeding gums, brown stain, floss shredding, and incomplete diastema closure in the area of teeth Nos. 8 and 9. The patient desired complete diastema closure and resolution of the above mentioned problems. She had previously received composite restorations to close her diastema. A plan including
preprosthetic orthodontics to evenly distribute the spacing followed by porcelain laminates was presented to the patient. She declined the comprehensive approach and was given informed consent regarding the esthetic compromises before beginning treatment.

The treatment plan chosen was to place Bioclear matrices with the Injection Molded Composite technique. First, the old composite was removed with a coarse flame-shaped diamond. Then the gingiva was lightly sculpted to create space for the delicate Bioclear sectional matrix (Case Photos 6 through 8). This sculpting can be accomplished with a mini tip and electrosurgery, laser, or sodium bicarbonate spray. In this case, sodium bicarbonate spray was used to simultaneously sculpt tissue and clean and detoxify the sickly cementoenamel junction surfaces.

Next we see an occlusal view of the Bioclear matrix (prototype stage) with rounded, anatomic adaptation to the root (Case Photo 9). No wedge is required to press the matrix to position.

The immediate postoperative result is featured in Case Photo 10. Because the patient had chosen “young” incisal mamelons from the tooth library, the teeth were lengthened and mamelons with vertical grooves to mitigate the squareness of the tooth were built into the anatomy.

Two-week follow up (Case Photos 11 and 12) showed improved tissue health in spite of the fact that the gingival contours are far more bulbous than in the first treatment.

Conclusion

The “magnification escalation” in dentistry is likely to continue. With advanced magnification, there are previously unthinkable possibilities. The extreme diastema closure represents one such possibility. New techniques and instruments are currently being developed to meet the needs of this growing segment of practicing dentists. The concept of rounded marginal profiles with exquisite tissue health is a significant departure from the past. Restorations created using the Injection Molded Composite technique and with anatomically specific matrices are a glimpse into the future.

Disclosure

Dr. Clark has financial interest in Bioclear and Interproximator matrix system components.

References