

# Composite Versus Porcelain, Part 3

## Modern Management of Deep Caries



David J. Clark, DDS

*This is the last in a 3-part article series. Part 2 was published in the April 2016 issue of Dentistry Today, and part 1 was published in the January 2016 issue. Both can be found archived online at [dentistrytoday.com](http://dentistrytoday.com).*

**D**r. G. V. Black mandated in 1890 that all caries must be removed. All state and regional examinations for dental licensure in North America will fail the applicant if any caries is left before restoring the tooth. But is this actually state of the art today? *Absolutely not!*

### SELECTIVE CARIES REMOVAL: THE NEXT BIG THING

For the past 125 years, teeth with deep caries likely required the operator to end up with a carious pulpal exposure. There were countless stressful “dance with the devil” episodes as we got as deep as we dared to remove as much caries as possible, all done *without* exposing the pulp. Multiple studies have shown that caries need not be treated as we have done until now.<sup>1</sup> Herald the new era of *selective caries removal*. In the past, some attempts were made at partial caries removal, in which the deep caries was left undisturbed, a temporary restoration was placed, and then reopened months later to do final caries removal and final restoration. This procedure has never been a mainstream procedure for several reasons. First, it required 2 separate invasive procedures with associated morbidities and multiple appointments, and these are never popular with patients. Second, the temporaries often fell out, requiring joyless and profitless babysitting. Third, it placed stress on the dentist, because if there was a pulpal exposure on the second appointment, it was disappointing to both patient and doctor. Fourth, the fee for the sedative filling was generally not commensurate with the time and complexity involved to do the procedure justice. In truth, it was a procedure mostly done in dental schools and low-fee clinics, not private

practice. Fifth, and to add insult to injury, many insurance companies have stopped coverage for pulp capping.

### What Is the Modified Hall Technique?

At the Bioclear Learning Centers (locations in Tacoma, Wash, and Solihull, England, UK), we have incorporated the Modified Hall Technique as part of the curriculum in Level 4.0 as a mainstream procedure that is elegant, patient friendly, predictable, and profitable. In other countries, such as Ireland and others in the United Kingdom, this has been the standard of care for decades. (Note: The new rules go beyond the scope of this article, and the reader is encouraged to attend a learning center course or lecture or webinar.) The quick summary is that the procedure is an “outside-in”<sup>2</sup> approach with the creation of a 1.5- to 2.0-mm clean margin. Simultaneously, all of the caries at the dentino-enamel junction (DEJ) *must be* removed. The Original Fisurotomy Bur (SS White) is an ideal instrument for this new task of aggressive removal of caries at the DEJ, leaving healthy dentin and enamel on the cavo-surface side of the bur and selective caries retention on the inside part of the preparation. The Standard Hall Technique was the traditional 2-appointment technique. The Modified Hall Technique, as we have coined the term, is a single appointment; a one-and-done procedure where the selectively retained caries will become hard, dried out, and essentially sterile via the nourishment and multiple healing factors infiltrating from both the pulp cells and the odontoblasts.<sup>3,4</sup> Case selection is key. The pulp must be vital and the teeth asymptomatic.

of his teeth. Additionally, by the time all of the tooth amputation required for traditional porcelain and endo-centric dentistry was performed, there would be insufficient tooth structure to retain the crowns. One of the paradigm shifts of the Modified Hall Technique is that the carious dentin in the center of the tooth changes from a liability to an asset.

In Figure 5, the maxillary left central incisor demonstrates the ideal prep for this tooth and for injection overmolding. The reader is encouraged to visualize how much tooth would remain after complete caries removal, endo access, and incisal and axial reduction for a full crown. The author would have cut away essentially everything left in this photograph. This case is striking because complete caries removal, endodontic access, and axio-gingival reduction for a porcelain crown would have, in sum, removed essentially all that was left of his teeth. And, the same nourishing features of the pulp/odontoblast complex that provide the healing of carious dentin also had kept his pulps alive and symptom-free in spite of the seemingly catastrophic caries present.

The patient’s treatment of teeth Nos. 6 to 11 was spread out during 2 appointments and 2 calendar years because he was on a budget and was trying to maximize his insurance benefits, a problem for aesthetic matching of porcelain, but not for injection overmolding with Bioclear anatomic anterior matrices.

Figure 6 is a pre-op view of the right lateral incisor (tooth No. 7) with solid enamel in the gingival-facial area. That asset must be maintained, and only a featheredge reduction was performed there.

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### CASE 1

#### Anteriors: Catastrophic Soda Caries

Figures 1 to 4 demonstrate the dilemma of G. V. Black rules. Our patient had caries that extended near and likely into all of the pulp chambers of his teeth. He was a heavy Dr. Pepper drinker in the past but was committed to changing his diet and home care. His previous dentist had recommended removal of all of his teeth and dentures because he could not afford root canals, posts, and crowns on all

Tooth No. 7 was blasted to remove biofilm (Bioclear Blaster), and all caries within 2.0 mm of the gingival margin was removed (Figure 7). Once the preparation was complete, Bioclear A-103 matrices were placed into position and 37% phosphoric acid gel (Scotchbond Universal Etchant [3M]) was applied (Figure 8). The Bioclear matrices control and contain the etching gel, allowing coverage of the entire coronal aspect of the tooth. The goal of optimal modern composite placement is to avoid

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To see 3-D videos of the scans in the following cases, please visit [dentistrytoday.com/clark-july-2016](http://dentistrytoday.com/clark-july-2016).

## CASE 1



**Figure 1.** The patient, despite significant decay, had no pain in his teeth. Because the pulps were still vital, he was an ideal candidate for the Modified Hall Technique.



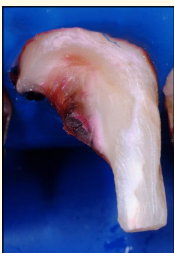
**Figure 2.** Post-op view demonstrates a life-changing transformation of his smile and countenance. The patient had no post-op sensitivity, and gingival tenderness disappeared quickly.



**Figure 3.** Pre-op radiographs. The primary goal of modern caries removal: 2.0 mm of clean margin and to never expose the pulp.



**Figure 4.** Post-op radiograph. The generous selectively retained caries was barely evident in the center of the tooth. Sometimes, it can be far more apparent on post-op radiographs.



**Figure 5.** The maxillary left central incisor demonstrates the ideal prep for this tooth and for injection overmolding.



**Figure 6.** Pre-op view of the right central incisor (No. 7). The solid enamel in the gingival-facial must be maintained. Only a featheredge reduction was performed there.



**Figure 7.** Tooth No. 7 was blasted to remove biofilm (Bioclear Blaster). All caries within 2.0 mm of the gingival margin was removed.



**Figure 8.** Tooth No. 7 has 2 Bioclear A-103 matrices in position with 37% phosphoric gel etchant (Scotchbond Universal Etchant [3M]). Bioclear matrices control/contain the gel, allowing coverage of the entire coronal aspect of the tooth.



**Figure 9.** Tooth No. 7, continued: A balance of heated, flowable, and paste (regular) composite has been injected into the forms. Teeth were individually prepped and overmolded.



**Figure 10.** The completed Tooth No. 7. A new 2-step polishing technique was used here (Bioclear Magic Mix Pre-Polisher and Jazz Polisher [SS White Burs]).



**Figure 11.** Patented Bioclear anterior matrices with multiple shapes and sizes shown. The A-103 matrices were used for tooth No. 7.



**Figure 12.** Equipment and materials for modern composite placement: Bioclear Blaster (for biofilm removal) and HeatSync Composite Heater (Bioclear).



**Figures 13 and 14.** Before and after photos.

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layering and hand manipulation of the composite whenever possible, so a balance of heated (to 155°F in a HeatSync Composite Heater [Bioclear]) flowable and regular composite resin (Filtek Supreme [3M]) was injected into the forms (Figure 9). It should be noted that while the compressive strength of monolithic Filtek Supreme is impressive at around 350 MPa, the diametral tensile strength is far less, so all incisal edges must be 2.0-mm thick. The teeth were prepped and overmolded one tooth at a time to maintain landmarks such as contact positions and axial inclinations. In this case, A-103 matrices were used for tooth No. 7. At only 50 μm, snug contacts can be created in many instances without a wedge. The snug apical fit of the matrix plus the power of heated flowable and heated creamy Filtek Supreme paste result in overhang-free margins with better

*Optimal modern composite placement is to avoid layering and hand manipulation of the composite....*

marginal integrity and better tissue response than average crown margins.

After any needed occlusal adjustments, the restorations in this case were all polished using new 2-step polish technique culminating with the Bioclear Magic Mix Pre-Polisher and Jazz Polisher (SS White Burs) (Figures 10 to 12). (This technique can be viewed in the video from the part 2 of this article series at [dentistrytoday.com](http://dentistrytoday.com), and also at [biomatrix.com](http://biomatrix.com).)

## Patient-Centered Versus Doctor-Centered Outcomes

I have retreated many porcelain cases that looked fabulous at the 5-minute follow-up, some that have even won awards at cosmetic dentistry academies, which were catastrophic failures at only 5 or 10 years postoperatively. We must look down the road with our patients (quite a few of whom might live into their 90s and older) and bank all of the tooth structure that we reasonably can. Additive dentistry that is also outcome-based dentistry can be just as transformative to many patients as more traditional (and more invasive) porcelain-centric dentistry. Note the transformation of case 1 (Figures 13 and 14). The author has done many

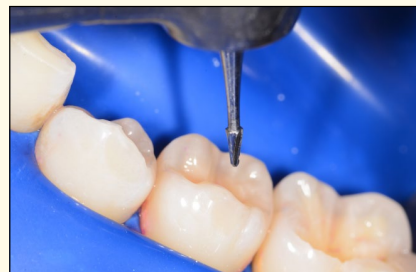
## CASE 2



**Figure 15.** Pre-op radiograph shows widespread occlusal caries, even though sealants had been previously done.



**Figure 16.** Tooth No. 18 with selective caries removal; calla lily prep (cusp tip to cusp tip), clean (blasted) enamel at the infinity edge; absolute caries removal at dentino-enamel junction. Red stained caries can be opaqued (Opaquer [Pulpdent]).



**Figure 17.** Fissurotomy bur in position to prep stain and caries from grooves before selective caries removal. Exquisite external seal required to achieve high success rate (reported in scientific literature at 95%).



**Figure 18.** Pre-op radiograph showing extremely deep caries in tooth No. 29.



**Figure 19.** Post-op radiograph demonstrating the new look of the Modified Hall Technique. The ideal margin displayed on the distal of tooth No. 29 is only predictable with *deep margin acquisition*.



**Figure 20.** Deep marginal caries removed, soft tissue near the deep margins removed, and a rubber dam placed. A medium diamond wedge was placed ("pre-wedge"). The surface at center of the tooth was like a soft noodle dentin (left alone). Another application of caries indicator would have stained bright red there.



**Figure 21.** The new Bioclear Bicuspid Twin Ring Separator is shown. It will not collapse into the preparation; twin nitinol wires will not stretch out and lose force as traditional NiTi spring separators do.



**Figure 22.** Completed restorations. No pulpal exposures had occurred; no reported post-op sensitivity.

*Thankfully, today's practicing clinicians have the resources to get the proper education...to benefit the patient.*

comprehensive porcelain reconstruction cases, but the new skills and materials required for this life-changing treatment put this as one of the author's proudest accomplishments.

#### What Material Should Be Placed Over Retained Caries?

In the author's opinion, *modern pulp capping is a microsurgical and natural healing event*, not a chemotherapeutic event. No disinfection of the retained carious dentin was performed in the study quoted above, and yet the success rates hovered around 95% for permanent and primary teeth. One probably cannot really sterilize a 2.0-mm pile of soft dentin. They did use resin modified glass ionomer, but the suggested healing action of the infected dentin was from the patient's own body, not from a bottle or tube of "magic" filling material. Bioactive materials may help dentin, but we don't know about their effect on carious/infected dentin. And, frankly speaking, with success rates at 95%, apparently all that we

really need is well-trained hands and proper case selection.

#### CASE 2

##### Posteriors: Catastrophic Failed Sealants and Caries Into the Pulp

The young patient here contacted me from another state after her dentist recommended 9 root canals and crowns on her posterior teeth. Because she could not afford that treatment, her only choice was to have most of her back teeth extracted. In addition, it did not make sense to her mother that so many teeth would need root canals since the teeth were not painful. The mother did an Internet search on failed sealants and found one of my videos on YouTube. After a brief exchange of emails, the patient and her mother traveled to our Tacoma office for Modified Hall Treatment.

The preoperative radiograph showed the devastating occlusal caries that had occurred in spite of sealants having been done previously (Figure 15). Although the patient had the

responsibility for follow-up care, she did not seek regular care; the sealants had given the patient a false sense of security. According to G. V. Black's rules, the patient would indeed have needed 9 root canals. Instead, I was able to do the Modified Hall Technique and modern cavity preparations combining fissurotomy, calla lily, and overlay cavity preparations. The 16 posterior teeth were treated in a marathon 6-hour appointment. Nine of those teeth required the Modified Hall Technique.

The treatment protocol of tooth No. 29 is briefly described in Figures 15 to 20. (The actual technique was shot through the lens of a Global AG [Global Surgical Microscope]. This, in addition to the patient interview, can be viewed at the websites [dentistrytoday.com](http://dentistrytoday.com) or [bioclearmatrix.com](http://bioclearmatrix.com).)

#### CLOSING COMMENTS

New treatment modalities are constantly being developed that will support modern conservative dentistry. This is the current direction in some areas of dentistry, hopefully leading us all to more patient-centered treatments and outcomes. The challenge is to change paradigms and to learn new skills. Thankfully, today's practicing clinicians have the resources to get the

proper postgraduate education and to implement their new knowledge and skills to the benefit of the patient. ♦

#### References

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**Dr. Clark** maintains a private practice in Tacoma, Wash, and is the founder of the Academy of Microscope Enhanced Dentistry. He is also a course director at the Newport Coast Oral Facial Institute. Along with Dr. Jihyon Kim, he is a co-director of the Bioclear Learning Center in Tacoma. He is on the editorial board for several journals, has lectured internationally, and served as a lecturer for CLINICIAN'S REPORT (formerly CRA) and also as a member of its board of directors. His main areas of interest include the redesigning of restorative and endodontic access preparations. He can be reached via email at [drclark@microscopedentistry.com](mailto:drclark@microscopedentistry.com).

*Disclosure:* Dr. Clark is the owner of Bioclear Matrix Systems.

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