



Chairside

With Ross W. Nash, DDS

Solutions for Postoperative Sensitivity

Considerable progress has been made in the development of new dental materials and techniques. Specific examples include adhesive restorative materials, highly wear-resistant polymers, the hybridization process, packable (condensable) posterior composite resins, and effective tooth whitening systems. New bur designs for modifying cavity preparations and metal-free bridges also can be included on this list.

Another aspect of restorative dentistry that has received considerable attention has been the problem of postoperative sensitivity. Although several techniques and materials have been recommended for solving this problem, complete success has been elusive. A lack of understanding of what precisely causes this sensitivity has contributed to the failure in solving it.

Possible approaches for defining a treatment came about through the efforts of Nakabayashi of Japan who introduced the hybridization process.¹ By removing the hydroxyapatite from dentin through acid etching and then replacing the mineral component with a resin polymer (dentin bonding agent), the

treated surface becomes totally impermeable to microorganisms. Such a procedure is currently being used by most clinicians to bond restorative materials to tooth structure. The hybridization process also provides the potential for reducing or even eliminating postoperative sensitivity.

As hypothesized by Brannstrom nearly 30 years ago, any condition that creates a negative pressure on the processes within the dentinal tubules will cause pain.² For example, reduced temperatures create a slight contraction of the fluids surrounding the odontoblastic processes, which generates a sensation of pain. Air drying the surface of the exposed or open dentinal tubules also commonly causes pain. In this case, the evaporation of the fluids at the ends of the open tubules creates an outward movement of the odontoblastic fluids surrounding the processes, resulting in pain.

Sealing the tubules through the hybridization process eliminates fluid movement. While such a procedure has been quite successful, patients may still experience postoperative sensitivity. The most obvious reason is failure

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by the clinician to completely seal all the tubules during the hybridization and bonding process. Hurriseal[®], a desensitizing agent, has been developed to resolve this clinical problem. It has had an excellent record at eliminating pain and sensitivity associated with exposed dentin.

Composition and Function

The essential components of Hurriseal[®] are benzalkonium chloride, hydroxyethyl methacrylate (HEMA), sodium fluoride, and water. The benzalkonium chloride serves as an antimicrobial agent and it participates in the cross-linking process associated with dentinal bonding. The HEMA component also serves a number of purposes. First, it is an excellent wetting agent (by reducing surface tension) that rapidly transports the desensitizing material into the open dentinal tubules. When the dentin is first acid etched, washed, and minimally dried, the Hurriseal[®] infiltrates into the spaces evacuated by the hydroxyapatite (Figures 1 and 2). The hydroxyl group associated with the HEMA molecule is readily taken up by the collagenous fibers, which are hydrophilic. If a dentin bonding agent is subsequently used in conjunction with Hurriseal[®], excellent bonding is routinely achieved.

Applications and Techniques

Hurriseal[®] can be used for a variety of purposes, including preparations for amalgam, composite resins, crown preparations, cervical sensitivity, during root scaling and/or planing, as well as in tooth whitening procedures. The application of the agent depends on the specific objective of the procedure.

Amalgam

If the preparation is to be restored without

first hybridizing the dentin, the desensitizing solution is applied to the dentinal surfaces with a cotton pledget or a brush with a simple rubbing procedure (Figure 3). After rubbing the surface for 20 seconds, the preparation is air dried. If, however, the surface of the preparation is going to be hybridized, then the process is slightly modified. After acid etching for 15 to 20 seconds, the surface is washed and then dried for 2 to 3 seconds. At this point, the Hurriseal[®] is applied with a cotton pledget and allowed to remain on the surface for 20 seconds. Rather than air drying the surface, the residual liquid is removed by placing the evacuation tip over the surface. This provides an appropriately wet surface for application of the dentin bonding agent. All subsequent bonding and restorative procedures are performed in a conventional manner.

Composite Resins

Acid etching and adhesion procedures (hybridization and bonding) should be carried out in conjunction with composite resin restorations. The procedure for this process is exactly the same as that previously described for amalgams when hybridization procedures will be used—the Hurriseal[®] desensitizing agent should be applied after the preparation has been acid etched but before the bonding agent is applied (Figure 4).

Indirect Restorations (Crowns and Onlays/Inlays)

Hurriseal[®] is also useful with crowns and bridges and other types of laboratory-processed restorations. Immediately after the preparation has been completed but before the impression is taken, Hurriseal[®] is applied to the tooth surface (Figure 5). Since no acid etching has taken place at this point, the procedure is the same as

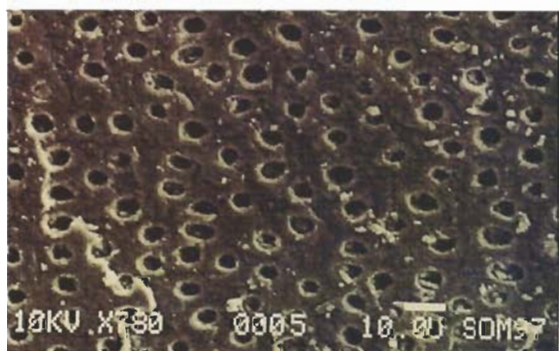


Figure 1—Scanning electron microscope (SEM) image of an untreated dentinal surface.

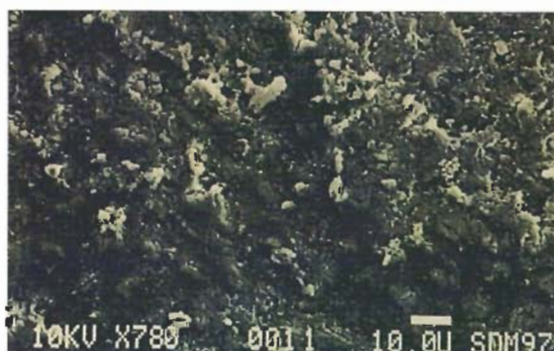


Figure 2—SEM image of dentin after being treated with Hurriseal[®].

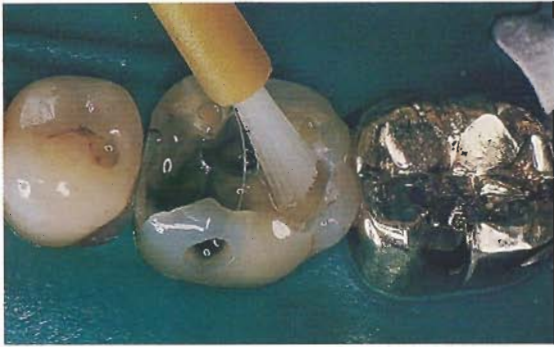


Figure 3—Hurriseal® can be applied to the cavity preparation before placing amalgam.

that used before the placement of amalgam without a hybridizing procedure.

Recently, it has been recommended that the preparation be hybridized with a single-component dentin-bonding agent before taking the impression. While such a technique is generally effective in eliminating or reducing the potential for sensitivity during the temporization process, clinicians have complained about stickiness between the prepared surface and the impression material.

The use of Hurriseal® accomplishes the goal of long-term desensitization but it does not result in any surface interaction. Furthermore, because the desensitizer does not add any dimension to the prepared surface, the clinician can be assured of no discrepancies between the prepared tooth and the resultant die. Because of the long-term effectiveness of the desensitizer, the patient experiences no sensitivity during or after the permanent cementation process. In addition, the prepared tooth can be completely and effectively hybridized just before the luting process (Figure 6). Finally, there are no restrictions related to the choice of cement. However, it should be cautioned that zinc oxide–eugenol temporary luting agents might be contraindicated if resinous luting agents are being considered.



Figure 5—Hurriseal® is applied to veneer preparations before the final impression is taken.

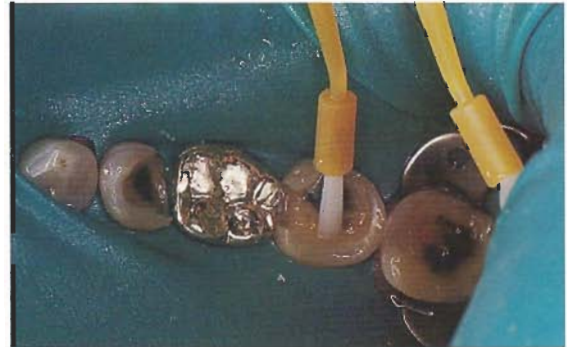


Figure 4—Hurriseal® is used after acid etching but before the application of primers and bonding agents for direct or indirect composites.

Sensitive Cervical Regions

Hurriseal® is also practical for use in sensitive areas of the cervical region. Simple regression of the gingival tissue or the presence of abraded lesions, as experienced in aging patients, often results in substantial sensitivity. Initiated by cold temperatures, the pain commonly is the result of the presence of opened dentinal tubules. Sensitivity may also be caused by sugar solutions from foods or liquids, which reduce the osmotic pressure of the surrounding fluids, resulting in negative pressure and pain. The presence of microorganisms that metabolize foodstuffs in the cervical region can also be a source of sensitivity.

The desensitizing solution is rubbed over the surface of the tooth with a large, spongy applicator for approximately 20 seconds. Normally, the procedure should be repeated two more times. This process is also very effective in conjunction with root planing. The root surfaces should be treated before and after the procedure.

Tooth Whitening

Finally, Hurriseal® is recommended for use in association with tooth whitening (Figure 8). In a recently completed study in Brazil, it was shown that the use of carbamide peroxide



Figure 6—Hurriseal® is used during cementation of an all-ceramic crown.



Figure 7—The application of Hurriseal® can help with the treatment of cervical sensitivity.



Figure 8—After in-office tooth whitening procedures, Hurriseal® can eliminate sensitivity.

agents actually etch enamel surfaces.³ Rather than producing a generalized etching pattern, the peroxide agents dissolve isolated groups of enamel rods all the way from the surface down to the dentinal enamel junction. When cold temperatures are introduced through food or drink, the fluids within the evacuated spaces begin to contract. Because there may be a continuation of the evacuated space all the way to the dentinal interface, the odontoblastic processes have an opportunity to respond.

Fortunately, these dissolved enamel rods eventually remineralize. But before that occurs, the potential for cold sensitivity is possible. The application of Hurriseal® effectively seals the openings of these evacuated spaces, eliminating the response to cold stimuli.

Conclusion

Sensitivity associated with dental procedures has long been a complaint by clinicians and patients. Now that the etiology for this sensitivity is largely understood, an effective remedy has been generated. As a desensitizing agent, Hurriseal® has been shown to be a cost-effective material for the treatment or elimination of sensitivities associated with dental procedures.

References

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