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Predictable Restoration of Posterior Teeth with Composite Resin

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COURSE OBJECTIVES

Upon completion of this course, the participant will be able to:

- List the ideal criteria for a direct composite resin restorative to be used as a posterior restoration
- List several general guidelines to improve clinical success with posterior composite resins
- List techniques that can minimize post-operative sensitivity with posterior composite resins
- Describe three di erent techniques or devices that will enhance the attainment of an anatomic proximal contact with a Class 2 composite resin
- Describe the technique for light curing that will minimize recurrent caries at the gingival margin of a Class 2 composite resin
- List the rationale for using a light curing device in the proximal box of a Class 2 composite resin
- Describe a predictable nishing technique for Class 2 posterior composite resins

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INTRODUCTION

For many years the restorative material of choice for direct placement restorations of posterior teeth was dental silver amalgam. Although dental amalgam is the most used restorative material for the posterior and has provided many years of outstanding clinical service[1], there has been a trend in recent years to restore posterior teeth with composite resin. e major contribution to the trend to use composite resin in the posterior region has been the signi cant improvements in adhesion of to enamel and dentin and the physical properties of composite resins.[2]

In the past the choices of composite resin types was somewhat limited. Today the introduction of improved composite resins with better physical properties and handling has led to a number of choices the practitioner can make for what type of composite resin to use to restore posterior teeth. e categories of composite resin to restore posterior teeth include hybrid, nano ll hybrid, high density radiopaque micro ll, low shrink nanocomposite and high viscosity (packable) composite resins. ese composite resins have demonstrated with in-vitro testing to be more wear resistant than previous small particle composite resins.[3-5] Clinical studies in the restoration of posterior teeth have shown that the current hybrid composite resins can be considered amalgam alternatives in routine sized preparations.[6-11] e expectation is that the nano lled hybrids will perform as well as, or better than hybrid composite resins. While silver amalgam, cast gold, and porcelain-metal are still the standard for posterior tooth restorations because of their durability and ability to resist wear, for routine sized preparations, composite resin can now be viewed as metal alternatives.[12-13] e American Dental Association Council on Scienti c A airs stated that composite resin restorations allow for more conservative preparations thereby preserving tooth structure. eir guidelines further stated that resin-based composites can be used for pit and ssure sealing, preventive resin restorations, initial Class 1 and Class 2 lesions using modi ed cavity preparation design, for moderate-sized Class 1 and Class 2 restorations. Consensus of the Council was not to use composites when teeth demonstrate heavy occlusal stress, sites that cannot be isolated, and for patients who are allergic or sensitive to resin-based composites.[12] e advantage of composite resins today over silver amalgam is that they are highly esthetic, reinforce tooth structure and can conserve more tooth structure in their preparation design. [14]

An ideal composite resin for restoring posterior teeth should ful ll the following criteria:

1. Wear similar to natural tooth structure or dental silver amalgam;
2. Have no plastic deformation in function;
3. Have a simple technique for placement;
4. Have minimal shrinkage during polymerization;
5. Have excellent marginal adaptation and sealing;
6. Have a radiopacity equal to or greater than enamel and dentin for ease of radiographic evaluation;
7. Have a quick, exact, non-tooth destructive nishing technique; and
8. Be esthetically pleasing in color and translucency.[15]

Some of the di culties with adhesive composite resins relate to problems with shrinkage and gap formation during polymerization and subsequent microleakage.[16] Gap formation caused by resin shrinkage can contribute to loss of adhesion, bacterial invasion, recurrent caries, postoperative sensitivity, and pain on mastication.[17] Polymerization shrinkage is one of the main factors that determine the longevity of composite resin restorations.[18, 19] Using devices to place the light closer to the gingival wall when light curing minimize the thickness of the composite resin and can alleviate some these problems. A major challenge with any composite resin restoration is the need for excellent isolation, usually using a dental dam, to insure an uncontaminated eld for the adhesive technique. In most cases the adhesive technique is multi-step and the area must be isolated from saliva and bleeding, as well as, take into account the time needed for the incremental placement technique for the composite resin to minimize polymerization shrinkage especially in the area of the gingival margin. Using a total etch with phosphoric acid technique the operator must be aware of not only the isolation but the attention to detail for the steps of adhesive placement, the additional step of re-wetting dentin for optimal bonding and the application of the dentin primer and adhesive resin.[21-23] Currently the acceptable techniques for composite resin adhesion in Class 1 and 2 cavity preparations are etch and rinse multiple bottle adhesive systems, etch and rinse single bottle adhesive systems, self-etch two-step adhesive systems and self-etch single step adhesive system.[6-8, 15, 24, 25]

TREATMENT PLANNING

Critical to success with posterior composite resins, is a thorough evaluation of a patient's occlusion and para-


Fig. 1


Fig. 2


Fig. 3

Fig. 1 Mandibular first molar with occlusal composite resin restoration and tooth exhibiting signs and symptoms of a cracked tooth. **Fig. 2A** Diagnosis of cracked cusp with Tooth Slooth. **Fig. 2B** Fracture line visualized with transillumination.

functional habits. Placement of composite resins when a parafunctional habit of bruxing exists can lead to greater wear of the composite than if a metallic restoration is present. For patients with parafunctional habits, ceramic restorations will signi cantly wear tooth structure and any other restorative materials, including composite resin and metallic restorations at a greater rate. Wear rates for posterior composite resin restorations are dependent on tooth position in the arch and the size of the preparation. Supporting cusps that are replaced with composite resin will demonstrate more wear than a non-supporting cusp that is restored. e wear rate increases as the preparation size at the isthmus increases beyond 1/3 intercusp distance.(7) Even with these factors in mind, the literature supports the use of composite resin as an equivalent to amalgam in moderately sized Class 1 and Class 2 preparations.(12)

Some general guidelines to improve clinical success with posterior composite resins include:

1. Preparations in which an occlusal contact is supported by tooth structure;
2. Supragingival preparation margins and ability to place the dental dam;
3. Preference of enamel margins, however, margins on the cementum of the root are acceptable if the margin is supragingival a er dam placement.

In the case where initial caries is only on the proximal surface a conservative slot preparation of the proximal surface combined with a sealant for the occlusal surface will su ce. When the caries extends into the occlusal pits and ssures or it is a replacement restoration of an existing Class 2 amalgam or composite resin, the isthmus width of 1/4 to 1/3 intercusp distance is preferable due to the decreased wear of the composite resin in function.

Although longevity of a composite resin improves with conservative preparations, there are times that a given clinical situation will dictate the use of a composite resin restoration. If a tooth colored restorative material is desired by the patient, there may be times a direct composite resin or an indirect composite resin inlay/onlay will be done. Contraindications to the use of composite resin as a directly placed posterior restorative can include the inability to place a dental dam or adequately isolate the area to ensure no contamination during restoration placement and patients that are allergic or sensitive to resin-based composites. Posterior teeth exhibiting moderate-to-severe wear due to attrition or parafunction habits are also not good candidates for posterior composite resins. It has been observed in research studies that larger than recommended tooth preparation sizes, especially those in second molars, will not be as durable as smaller preparations in the same area. In these cases laboratory fabricated restorations especially when cusps are being replaced are a better choice. (26)

MINIMIZING POSTOPERATIVE SENSITIVITY

A chief complaint among practitioners with composite resin restorations has been the rate of post-operative sensitivity especially using etch and rinse adhesives following the placement of Class 1, 2, and 5 restorations. In many cases post-operative sensitivity is seen at higher rates with rst time restorations and in younger patients. A number of clinical studies have investigated post-operative sensitivity using both etch and rinse and SE adhesives.(27-32) e results of these studies demonstrated no di erence in post-operative sensitivity between a both adhesive types. In fact, the conclusion of one study stated that postoperative sensitivity may depend on the restorative technique and variability among operators rather than on the type

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Fig. 3 Completed cavity preparation with the removal of the distolingual cusp. **Fig. 4** After placement of the self-etch adhesive (iBond) light curing and a color adaptive nano hybrid composite (Venus), the restoration was shaped with a finishing bur (Axis) **Fig. 5** Final finish and polish with a diamond infused universal composite polisher (Jazz). **Fig. 6** Completed restoration eliminating patient's symptoms of cracked tooth. **Fig. 7** The use of the Trimax (AdDent) tip to enhance light curing in the proximal box.

of enamel-dentin adhesive used.[27] One area of inconsistency with etch and rinse bonding has been the bonding potential to desiccated dentin.[33, 34] The inherent chemical nature of SE adhesives is that they are water containing, as such because they are no rinse, the dentin surface is left moist. This may account for the case reports of minimized post-operative sensitivity.[35] Also with SE bonding the variability between operators can be minimized by simplifying the technique of adhesive placement.[32, 35]

How do you minimize post-operative sensitivity? While the data in research studies clearly states that there is little difference in strategies to avoid your patients having post-operative sensitivity, there are some techniques that, through my experience teaching dentists and dental students, can solve this dilemma. For cavity preparations that are of ideal depth, use of a self-etching adhesive has been beneficial at reducing postoperative sensitivity. For preparations just barely into dentin I have also successfully used glutaraldehyde-based desensitizing agents (GLUMA, Hereaus and Calm-It, Dentsply) in the cavity preparation after etching before application of a bonding agent. For deeper preparations, use of glass ionomer liners and flowable composite resins as liners have shown a decreased rate of post-operative sensitivity as reported to this author by practitioners who have made these changes.

CASE REPORT 1: CLASS 1 RESTORATIONS

A 35 year old patient had a chief complaint of pain upon biting on his mandibular first molar. (Figure 1) An examination revealed an existing occlusal composite restoration. Using a Tooth Slooth (Professional Results Inc) and transillumination the diagnosis of a cracked tooth with a fracture of the distolingual cusp was made. (Figure 2)

The existing composite resin was removed using a 245 enhanced-blade, geometry-dentated bur (Great White 245 GW, SS White Burs).

The completed preparation included removal of the distolingual cusp. (Figure 3) A single component, unit dose dispensed self-etch adhesive (iBond, Heraeus Kulzer) was applied to the cavity preparation by painting the cavity preparation with two coats of iBond and that was agitated in the tooth preparation for 20 seconds. A gentle air stream was then used to thin and evaporate organic solvent from the adhesive. The tooth surfaces had a glossy appearance and the adhesive was then light cured for 20 seconds with a conventional quartz-halogen light-curing unit (Optilux 501, Kerr Demetron). A wear resistant, nano filled hybrid, color adaptive composite resin, Venus (Hereaus Kulzer), was placed into the cavity preparation and light cured. The restoration anatomy was defined and finished with composite resin finishing burs (Axis))(Figure 4). The surface was then polished with a diamond infused universal composite resin polishing cup (Jazz, SS White)(Figure 5). The completed esthetic restoration was well sealed. (Figure 6). The patient reported no sensitivity to mastication after the restoration was placed.

RESTORING CLASS 2 RESTORATIONS

Clinical evidence has demonstrated that Class 2 composite resins have significantly higher rates of caries at the gingival margin when compared

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to amalgam restorations.[36-38] Reasons for these signi cant di erences in caries rates at the gingival margins of Class 2 composite resins can relate technique sensitivity of some dentin bonding systems, polymerization shrinkage of composite resin, challenges in techniques placing highly viscous composite resin into proximal boxes without trapping air bubbles leading to poor marginal adaptation, contamination of the tooth surfaces due to poor isolation of the eld, and poor polymerization of the resin adhesive and composite due to inadequate output of a curing light[39, 40] and distance of the light guide from the gingival margin.[41-43] Xu et al evaluated investigated adhesion of composite resin as the distance from the light guide increased. eir investigation was prompted by the number of studies demonstrating poor marginal seal and, increased microleakage at the gingival margin of these restorations when compared to the occlusal enamel margins. eir conclusion was that when curing adhesives in deep proximal boxes with a curing light of 600 mw/cm2 the curing time should be increased to 40-60 seconds to ensure optimal polymerization.[44]

Key points to light curing Class 2 composite resins include:

1. Check your light output. Less than 600 mw/cm2 of output requires doubling your curing time in the proximal box of a Class 2.
2. having the light probe tip clean of any contminants and as close to the tooth as possible, having a protective sheath covering the light probe and resting the probe on the posterior cusps.
3. When placing the light guide, the light guide should be at right angle to the tooth being restored.
4. Cure a minimum of 20-30 seconds in the proximal box for the adhesive and then the rst increment of composite resin.

ACHIEVING PREDICTABLE PROXIMAL CONTACTS

An o en occurring problem with Class 2 composite resin restorations has been the achievement of a predictable, anatomic proximal contact.[15, 45] is problem directly relates to the fact that composite resins are viscous materials that cannot be condensed and pushed against matrix bands in a predictable manner. Even the most viscous packable composite resins are liquids that can be moved but not made more dense holding their shape to move a matrix band to achieve proximal contact and adaptation through movement of the teeth during the placement process.[46] Although the use of prewedging before tooth preparation can help alleviate the de ciency of compensating for thickness of the matrix band[15], modi cations in matrix design, type of metal used, thickness and retainer system have been introduced to eliminate the problem of poor proximal contacts with composite resin. e most commonly used device for attaining proximal contacts has been thinner, dead so stainless steel matrix bands. ese bands are available either for use in a To emire type matrix retainer, e.g., the HO band (Young Dental), a 0.001" dead so stainless steel To emire type matrix band, Microbands (Dental Innovations) a conventional To emire type matrix band that has been machined to be ultrathin in the contact area, or as a circumferential retainerless matrix, e.g., Automatrix (Dentsply/Caulk) or Supermat (Kerr/Hawe). ese circumferential

Fig. 8A-8B Example of V3 ring (Triodent) applied to Class 2 cavity preparation. **Fig. 9** Example of Composi-Tight 3D Soft Face ring (Garrison Dental Solutions) **Fig. 10** Preoperative view of the mandibular second premolar with distal caries. **Fig. 11** Completed Class 2 proximal slot preparation with the gingival wedges in place.

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Fig. 12


Fig. 13

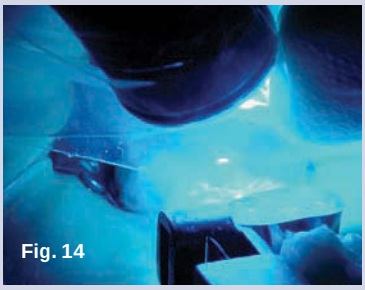
Fig. 14


Fig. 15


Fig. 16

Fig. 12 HO band placed. **Fig. 13** S e l f etch adhesive (Xeno IV) applied in cavity preparation and air thinned. **Fig. 14** The adhesive was light cured for 30 seconds with an LED curing light. **Fig. 15** Composite resin (TPH3) placed in the Class 2 cavity preparation. **Fig. 16** After the second increment of composite resin had been placed, it was shaped with a hand instrument wetted with adhesive resin.

type matrix systems are ideal for use with Class 2 MOD preparations. For two surface Class 2 preparations restoring only a single proximal surface, a sectional matrix system, e.g, Palodent matrix with BiTine Ring (Dentsply/Caulk), Contact Matrix (Danville), or ComposiTight matrix with G-Ring (Garrison Dental Solutions) utilizing an ultrathin dead-so stainless steel sectional matrix in combination with a ring that when placed achieves some additional tooth separation. A signi - cant problem with these ring based systems is that many times the ring sits on top of the dental wedge. is is problematic, especially for short crowned teeth, in that the ring easily dislodges and comes o , many times ying out of the patient's mouth striking the practitioner in the face. It is critical that clinicians wear eye protection to avoid possible damage to the eye from this projectile. Recently two innovative ring systems using so silicone have been introduced to address the frequency of ring dislodgement. One system, V3 ring (Triodent) utilizes a "V" shaped separating ring design so that unlike other ring systems that usually are positioned occlusally from the gingival wedge, the V3 ring straddles the wedge.(Figure 7) For the Composi-Tight 3D So Face ring (Garrison Dental Solutions), the ring is shorter but covered in silicone so the teeth are rapidly separated by the force of the ring, while being stabilized on the tooth crown so that it does not become displaced during restoration placement.(Figure 8)

Besides thin matrix bands, other devices have been introduced to assist in achieving a positive, anatomic proximal contact with Class 2 composite resins. Some of these devices e.g., contact formers (American Eagle Instruments) and Contact Pro (CEJ Dental) allows the clinician to push against the matrix band while light curing. While these devices can achieve the desired result, they are limited in that they don't t all preparations. e Light-Tip® (Denbur, Inc) and the ProxiCure tips (Ultradent) are tted over the light tip and can be inserted into the proximal box of the cavity preparation and allows for light penetration into the critical gingival area of the tooth preparation.[29] Unfortunately, because of the tip's design it will not form the contact predictably in the correct anatomic location and in some instances its size precludes its use in more conservative cavity preparations. Recently a smaller, more anatomically shaped tip, Trimax™ (AdDent) was introduced that enhances light dispersion into all aspects of the proximal box while at the same time allowing for pushing on the matrix band to achieve a positive anatomic proximal contact.(Figure 9) It is easy to control and if necessary is easy to adjust for minor modi cations due to preparation size and shape. It is a single use disposable tip so that problems associated with a decrease in light intensity penetrating through tip due to repeated autoclavings is not a problem. Another bene t of using a light-conducting device such as the Trimax is that there will be a reduction in the volume of composite resin being cured in the proximal box at the gingival margin leading to a reduction in the polymerization shrinkage gaps that can occur.[26, 27] e light transmitting device directs the energy of light curing to the depths of the composite resin

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Fig. 17 The restoration was marginated with a round ended tapered finishing bur. **Fig. 18** Final finish/polish was accomplished with a diamond impregnated polishing brush (Occlubrush, Kerr) with a diamond polishing paste with a prophylaxis brush. **Fig. 19** A 12A scalpel blade was used to remove excess resin in the gingival embrasures area. **Fig. 20** Completed restoration of the mandibular second premolar.

in the proximal box.

CASE REPORT 2

is patient presented with clinical and radiographic evidence of caries on the distal surface of the mandibular second premolar. (Figure 10). A er administration of local anesthesia, a dental dam was placed. To achieve rapid separation of the teeth to compensate for the thickness of the matrix band, mesial and distal wedges were rmly placed into the gingival interproximal embrasure. e tooth was prepared with a 245 bur (SS White) with a high speed handpiece and water spray. e preparation design for a Class 2 composite resin should have cavity walls that are convergent or parallel from the pulpal wall. e occlusal cavosurface margins must be at right angles to the cusp ridges. is right angle margin allows for a bulk of composite resin at the high stress bearing occlusal margin to prevent composite resin fracture at the tooth-restoration interface. With the tooth prewedged with gingival wedges before starting the preparation to achieve rapid separation of the tooth from its adjacent teeth to compensate for thickness of the thin metal matrix, the preparation was then completed as a slot preparation.(Figure 11) e occlusal surface was not carious so it did not need to be included in the preparation design. When restoring the proximal contact, a thin, dead so stainless steel matrix band allows shaping and achieving a positive, anatomic proximal contact. For this case the decision was made to use a To emire-shaped matrix made from 0.001 inch thick dead-so stainless steel HO Band, Young Dental). (Figure 12)

A self-etch adhesive (Xeno IV, Dentsply Caulk) was painted into the cavity preparation and air thinned before light curing.(Figure 13) e adhesive was light cured for 30 seconds.(Figure 14) A er light curing the adhesive, the nano lled micromatrix hybrid composite resin, TPH3 (Dentsply Caulk) was inserted into the proximal box with a thickness of 2 mm to minimize volumetric polymerization shrinkage of the composite resin.(Figure 15) e composite resin was light cured for 20 seconds with a high intensity LED curing light (Allegro, Den-Mat).(Figure 15) e cavity preparation was then lled to the occlusal cavosurface margin and shaped with a burnisher lightly wetted with adhesive resin (Figure 16) and then light cured for 20 seconds.

With the matrix removed, the proximal surface was shaped with a long, needle-shaped nishing bur (Axis) followed by shaping, nishing or the occlusal surface with a tapered, rounded end nishing bur (Axis). (Figure 17) e nal nish and polish was accomplished with a diamond impregnated composite resin polishing brush (OcclusBrush, Kerr) on a slow speed handpiece in a right angle latch-type contra-angle.(Figure 18) e goal for nishing and polishing any posterior composite restoration is that it feel smooth to the patient's tongue and thus be acceptable.

e most di cult to access margin of any posterior Class 2 restoration is the gingival interproximal margin. Finishing strips do not work well on rounded or concave root and interproximal surfaces. Likewise, rotary handpieces with rotating diamonds and burs, o en used in interproximal areas, are contraindicated because they can create unnatural embrasures and notched and irregular surfaces. is margin can be best managed and nished using a Pro n Reciprocating Handpiece with a Lamineer tip (Dentatus). e at safe-sided abrasive

Lamineer tip allows for precise and controlled nishing and polishing of the cervical interproximal mar-

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gin. An alternative instrument that can be used to remove excess resin in these areas is a 12A scalpel blade. (Figure 19)

e occlusion was checked and there was no need for any further adjustment. e nal restorations demonstrate excellent anatomic form. (Figure 20)

CONCLUSION

e concepts and techniques described in this article can be used to provide patients with durable and esthetic posterior composite resin restorations. To ensure the attainment of an anatomic proximal proximal contact prewedging, specialized matrices and light curing devices will eliminate the problems that have manifested in the past when restoring proximal surfaces with composite resin. Postoperative sensitivity can be minimized with posterior composite resins by using bondable resin or glass ionomer liners for moderate depth cavity preparations, glutaraldehyde desensitizing agents or self-etch adhesives. With the current evidence available, it is expected that these nano ll hybrid composite resin restorations will do as well as the conventional hybrid composite resins that have been used for more than 15 years.

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1. e categories of composite resin to restore Class 2 preparations according to this article include:
a. nano ll hybrid
b. hybrid
c. high density micro ll
d. high viscosity packable
e. all can be used to restore Class 2 preparations

2. With the current available evidence that moderately sized preparations restored with composite resin can be considered silver amalgam alternatives.
a. True
b. False

3. According to the Consensus report of 1998 by the American Dental Association Council on Scienti c A airs contraindications for the use of posterior composite resins include all the following except. e exception is
a. Class 2 preparations
b. Teeth that demonstrate heavy occlusal stress
c. Sites that cannot be isolated
d. Patients allergic or sensitive to resin based composites

4. General guidelines to improve the clinical success with posterior composite resins include all the following except. e exception is
a. preparations should have an occlusal contact supported by tooth structure
b. the preference is to end all margins on enamel
c. subgingival margins on root surfaces place the restoration in a protected area
d. preparation margins above the free gingival margin that can be isolated with rubber dam are preferred

5. One major problem with composite resins is volumetric polymerization shrinkage. is shrinkage can relate to problems with
a. gap formation at the margins
b. microleakage
c. recurrent caries
d. post operative sensitivity
e. all the above

6. Composite resin will wear in stress bearing areas. e amount of wear is dependent upon
1. size of preparation
2. parafunctional habits
3. bonding agent used
4. time of etching
5. tooth position in arch
a. 1, 2 and 3 only
b. 1, 2, and 4 only
c. 1, 2, and 5 only
d. 1, 2, 3, and 4 only
e. 1, 2, 4, and 5 only

7. Postoperative sensitivity a er placement of posterior composite restorations can occur. A liner that can be used to minimize postoperative sensitivity according to this article is
a. zinc phosphate cement
b. calcium hydroxide paste
c. glass ionomer
d. polycarboxylate cement

8. A glutaraldehyde desensitizing agent, e.g., GLUMA or Calm-It can be applied to a posterior cavity preparation before composite resin restoration to minimize or eliminate postoperative sensitivity.
a. True
b. False

9. ere have been reports from practitioners that they have reduced postoperative sensitivity with posterior composites by modifying the adhesive procedure. is modi cation is
a. etch dentin no more than 30 seconds
b. etch enamel no more than 15 seconds
c. use a self-etch adhesive
d. use only a light cure etch and rinse adhesive

10. A technique to evaluate a cracked tooth is
a. having the patient bite on a Tooth Slooth
b. make a bitewing radiograph
c. do an electric pulp test
d. do a cold test

11. Clinical research cited in this article has demonstrated that Class 2 amalgam and composite resin restorations have the same rate of caries at the gingival margin.
a. True
b. False

12. Reasons for di erent caries rates at the gingival margins of Class 2 composite resin restorations when compared to amalgam may be due to
a. technique sensitivity in the placement of adhesives
b. polymerization shrinkage of composite resin
c. challenges in place composite resin to adapt to the gingival cavosurface of the cavity preparation
d. poor isolation of the tooth during restoration
e. all the above

13. e distance of the light tip from the gingival wall of a Class 2 cavity preparation when light curing requires an increase in curing time to have adequate polymerization of the adhesive and composite resin.
a. True
b. False

14. To have adequate light curing of an adhesive and composite resin in a proximal box of a Class 2 preparation you should
a. check the power output of the curing light on a regular basis
b. check that the tip of the curing light probe is free from contaminants
c. have the curing light tip probe as close to the tooth as possible when curing.
d. cure for at least 20-30 seconds in the proximal box
e. all the above are correct

15. All the following are techniques that help achieve a predictable, anatomic proximal contact except. e exception is
a. thick, rigid copper bands
b. thin, dead so stainless steel matrix bands
c. prewedging the tooth prior to tooth preparation to achieve rapid separation to compensate for thickness of the matrix band.
d. Devices to push against the matrix band during light curing

16. One problem commonly seen with sectional matrix ring systems is that the ring usually sits occlusally on top of the gingival wedge. For short crowned teeth, the ring has a likelihood of dislodging.
a. True
b. False

17. All the following are specialized matrix systems for restoring Class 2 posterior composite resins EXCEPT. e EXCEPTION is
a. Palodent matrix with BiTine ring
b. ComposiTight matrix with G-ring
c. V3 matrix system
d. Invincible system

18. e Trimax ™ tip helps to achieve proximal contact by enhancing light dispersion in all aspects of the proximal box while at the same time pushing the composite resin up against the matrix band to achieve a positive proximal contact.
a. True
b. False

19. Instruments for nishing an excess of composite resin at the gingival margin of a Class II composite resin restoration include
a. Hollenback carver
b. Pro n reciprocating handpiece with a at, safe-sided abrasive lamineer tip
c. #12A scalpel blade
d. round nishing bur
e. b and c

20. e nal polish of the occlusal surface of the composite resin restoration needs to be smooth to the patient's tongue. is can be accomplished with a diamond impregnated composite polishing brush.
a. True
b. False

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