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PIT & FISSURE SEALANTS

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- Describe the e ectiveness of resin pit and ssure sealants as shown in clinical studies
- Explain which teeth and surfaces should be sealed
- List the types of pit and ssure sealants that are available
- Discuss the di erences between di erent types of sealants including the newer moisture-tolerant, resin-based type
- Describe the technique for placing sealants

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INTRODUCTION

Signi cant progress has been made in the prevention of dental caries in children and adolescents over the past thirty years. While caries is decreasing on interproximal surfaces, occlusal pit and ssure caries continue to increase.[1,2] In general, caries on occlusal and buccal/lingual surfaces account for almost 90% of caries experienced in children and adolescents.[3] e reason for this high rate of caries relates speci cally to the pit and ssure morphology of occlusal and buccal/lingual surfaces that are not a ected by the caries-preventive e ects of systemic and topical uorides.

Fig. 1: A 5½-year recall of a moisture tolerant resin based sealant (Embrace WetBond sealant, Pulpdent). Dentistry by Joseph P. O'Donnell, DMD, MS; private practice, Winchester, MA.

Fig. 2: Embrace WetBond Sealant placed next to a drop of water. Note the submicron resin lm on top of the water as Embrace combines with the water. This activates the material's acidity and a nity to the etched enamel surface. (Images courtesy of Pulpdent.)

Sealants are the most e ective clinical technique to prevent pit and ssure caries. e cost effectiveness of sealants, naturally, is based upon sealant retention. While the rates of sealant retention on occlusal surfaces are relatively high at ve years,[4-7] sealant retention for buccal and lingual pits and ssures of molars is considerably lower.[8] In a study comparing retention of self-cure and light-cure sealants, marked di erences in sealant loss were reported between occlusal and buccal/lingual surfaces at two years.[8] ere was 88% complete sealant retention of the self-cure sealant on the occlusal surface but only 35% retention on the buccal/lingual surfaces.[8] e light-cure sealant had a retention rate of 81% for the occlusal surfaces compared to a 39% rate of retention on the buccal/lingual surfaces. ese data indicate that, while the loss of sealant from occlusal surfaces averages 5-10% a year, for buccal and lingual surfaces the percentage of sealant loss increases to 30% per year, rendering this procedure less reliable. us, based on sealant retention rates, it follows that the occlusal surfaces should be easier to protect from caries than buccal/lingual surfaces.

While there is a desire to seal all at-risk teeth, the question arises of how to handle di cult-to-seal teeth such as the partially erupted dentition. Dennison et al investigated retention of sealants on at-risk teeth that were fully erupted compared to those that were partially erupted.[9] ree years after sealant placement, it was found that no replacement of sealants was necessary for the fully-erupted, sealed teeth while teeth with gingival tissue at the level of the distal marginal ridge had a 26% sealant replacement rate. When the gingival tissue was over the distal marginal ridge at the time of placement, the replacement rate rose to 54%. Clearly, isolation of eld and access to the pits and ssures contribute to sealant success. Teeth should therefore be more fully erupted into the oral cavity before attempting the placement of a resin sealant.

Here lies the dilemma: clinicians and hygienists want to seal pits and ssures when permanent teeth are rst erupting, when isolation is very di cult or impossible. Typically, resin adhesion to etched enamel requires a clean, dry enamel surface. Resins used as sealants are typically not moisture tolerant. If using a resin sealant, teeth should therefore be more fully erupted into the oral cavity before attempting the placement. Also, since isolation is di cult in semi-erupted permanent molars and loss of sealant at highest risk, it would be useful to have the ability to evaluate the retention of the sealant on the surface.

A recent, signi cant development with resin based sealants is the development of moisture-tolerant chemistry. In the past, isolation and exclusion of moisture with resin-based sealants was required. A moisture tolerant, resin-based sealant does not require an additional bonding agent. e rst such product to be introduced (Embrace WetBond; Pulpdent) has physical properties similar to other commercially available sealants.[10-12] A practice based, 2-year clinical research study evaluated this etch-and-rinse resin sealant in the prevention of pit and ssure occlusal caries.[13] In this report, of the 1,102 teeth evaluated in this two-year study, none of the teeth evaluated had developed occlusal caries during the two-year period. 1,047 remained intact with good marginal integrity. 55 of the teeth evaluated had the sealant repaired or replaced at some time during the two-year period. Currently, recalls in this same study include cases over ve years. (Fig. 1)

In order to achieve these desirable, moisture-resistant properties, a hydrophilic resin chemistry that is completely di erent from the typical hydrophobic Bis-GMA resins was developed. e changes in the chemical technology incorporate di-, tri- and multi-functional acrylate monomers into an advanced acid-integrating chemistry that is activated by moisture. Unlike traditional sealants, the surfaces of the teeth to be sealed should be slightly moist. is moisture tolerance allows the sealant to integrate to the etched enamel surfaces creating a leak-free interface be-

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tween resin and tooth. When Embrace WetBond sealant is applied to the moist surface of the tooth, it is activated and the material becomes acidic. Once the sealant is light cured, it has a neutral pH and is no longer a ected by water. A typical sealant will not spread over a moist tooth surface due to its hydrophobic nature. Embrace, with its unique chemistry, is miscible with water and will ow into moisture containing etched enamel with which it combines. (Fig. 2) By their nature, tooth structure, enamel and dentin inherently contain water.

Clinically, a moisture tolerant sealant makes sense. Unless a clinician is using a dental dam, the oral cavity is 100% humidity with a temperature that mimics the Amazon jungle. Even the driest tooth surfaces contain moisture. Also, since the permanent rst molars are the teeth at greatest risk, one wants to seal them when isolation is the most dif- cult. A moisture tolerant resin sealant is necessary. Up to this point in time, the only moisture tolerant sealants were glass ionomers. eir mechanism of adhesion was ionic bonding, not micromechanical retention, to an acid etched enamel surface.[14] In studies of glass ionomer sealants, it has been reported that at three years, retention was only 31%.[15] Pardi and coworkers also reported low sealant retention rates with glass ionomers.[16]

Pit and Fissure Caries: Morphology and Prevention

Using a dental mirror and explorer during a clinical examination, a clinician makes the observation that there are pits, ssures and grooves on the surfaces of teeth. e diagnosis of carious pits and ssures, however, can often be daunting, especially with recent changes in the diagnosis and treatment of caries.[17,18] e concept of using a sharp explorer for the detection of pit and ssure caries has been discarded in favor of the visual appearance of enamel, radiographic diagnosis and new types of devices.[19] Even with newer technologies for caries diagnosis, it is still di cult to chart the progression of the disease[20-23] since considerable variation is noted when this type of caries is examined microscopically.[24] Nagano described three variations in pits and ssures according to their appearance in cross section, namely: V-type, U-type and I-type pits and ssures.[25] In most cases, the shape of the pit or ssure is such that it is impossible to clean, explaining the high susceptibility of pits and ssures to dental caries.

In the 1960's, Buonocore and coworkers investigated the use of adhesives to seal caries-susceptible pits and sures.[26,27] By the late 1970s and early 1980s, the clinical data on sealants and caries prevention was very positive. A four-year clinical evaluation of sealant retention comparing sealed with non-sealed teeth demonstrated an overall 43% decrease in the prevalence of caries e ectiveness with a signi cantly better sealant retention on premolars (84%) than molars (30%).[28] A later, seven-year study by Mertz-Fairhurst and co-workers reported 66% complete sealant retention and 14% partial retention.[29] Sealant loss was 20% while there was a 55% reduction in caries rate for the sealed teeth versus the unsealed teeth. In a more comprehensive ten-year observation of over 8,000 sealants placed on permanent rst molars, there was 41% complete sealant retention at 10 years and a 58-63% retention rate over 7 to 9 years.[30]

Simonsen has reported on the retention and e ectiveness of a single application of sealant to permanent rst molars at both 10 and 15 years.[31,32] His results indicated that at 10 years, 56.7% of sealants were completely retained and

Fig. 3: Occlusal surfaces preoperatively.

Fig. 4: Etching the occlusal surfaces.

20.8% were partially retained. Sealant was missing from 6.9% of the surfaces while 15.6% of the treated surfaces had been restored or were carious. In the sealed group, 84.4% of the pit and ssure surfaces of the rst molars were caries free. Of the unsealed, matched-pair group, only 31.7% of the rst molars were caries free. At 15 years, 27.6% of the teeth still had complete sealant retention with a further 35.4% maintaining partial retention. Of those teeth sealed, 68.7% were caries-free when compared to the matched pair of unsealed rst molars, of which only 17.2% were caries free. Also, sealant success is multifactoral. Technique, ssure morphology and the characteristics of the sealant contribute to clinical success.[33]

A basic concept of 5-10% of sealant loss per year has been seen when one reviews published sealant data.[34] is data reveals the importance of reevaluating teeth with sealants on a periodic basis and to reapply if necessary. If one were to nd a negative aspect of sealants in the realm of den-

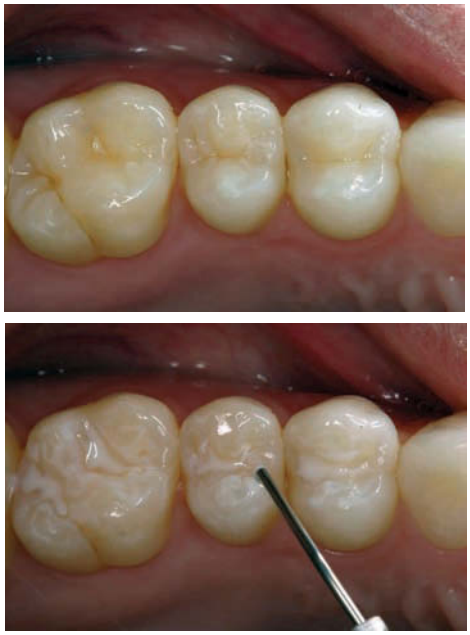

Fig. 5: Etched occlusal surfaces with slight moisture (glossy appearance) before the application of the sealant.

Fig. 6: Direct application of sealant with canula tip.

tal prevention it would be the failure of clinicians to reevaluate and reapply sealants when they are lost or failing. Failure to maintain sealants will lead to previously susceptible pits and ssures that were sealed becoming susceptible to bacterial invasion with the need for more invasive tooth preparations and restorations. [34]

Table 1 lists factors to be considered for early sealant failure. Based upon the data reported in the aforementioned clinical research reports, it is important that patients with sealants have periodic re-evaluations and reapplication of sealant if necessary. When a sealant needs to be repaired or reapplied, the tooth should be treated as if an initial sealant is to be placed.[35]

Identifying Teeth That Need to be Sealed

Based upon clinical studies, teeth can be classi ed as sound or incipient-at risk. Heller and colleagues compared teeth that were sound and at risk for caries progression by comparing sealed and unsealed teeth in the same mouth.[36] Teeth that were initially sound had a caries rate of 13% at ve years when unsealed and 8% when sealed. Teeth that were classi ed as incipient-at risk had a caries rate of 52% at ve years when unsealed compared to only 11% when sealed. While the bene t of sealing sound teeth (a di erence of 13% to 8%) may not be signi cant, there is no doubt that sealing teeth at risk has a substantial bene t.

Deciding which teeth are at risk will vary from clinician to clinician and the decision will be based upon their experiences. A possible criterion that may be used is the determination of whether the tooth has deep occlusal pits and ssures. Classically, the diagnosis of pit and ssure caries is done using a sharp explorer tip and tactile feedback as the explorer is probed into invaginated pits and ssures. Typically, the diagnosis of caries is made if the explorer tip has "tug back" when forced into the pit and ssure. e reliability of the explorer in diagnosing pit and ssure caries was characterized at only 24%, meaning that 76% of the time that tug back was present, there was no caries.[37] Further, concern has been expressed that a sharp explorer tip can damage an early de-mineralized white spot lesion of the enamel by cavitating the surface.[38]

While the use of an explorer and radiographs is second nature for the diagnosis of caries, a new device that uses laser uorescence has improved the reliability for caries diagnoses in pits and ssures.[20, 23, 39] e DIAGNOdent (KaVo) laser uorescence unit takes advantage of the fact that the light re ecting and uoresing properties of normal, healthy enamel di ers from the characteristics of enamel surfaces in pits and ssures when attacked by dental caries. Using a laser light with a wavelength of 655nm, the laser demonstrates no uorescence when used to irradiate sound tooth structure. Carious tooth structure, however, will uoresce and re ect light with an altered wavelength. A visual display and audio cues alert the clinician to these changes. Recently, a more portable DIAGNOdent Pen (KaVo) that is battery powered has been introduced that is easier to use and more operator friendly.

How reliable are the techniques used for diagnosis of pit and ssure caries? One study compared visual techniques to disclosing solutions. Visual techniques were only correct 53% of the time while caries disclosing dyes gave a correct diagnosis only 43% of the time.[40] Another study that compared four di erent techniques, namely radiographs, sharp explorer, caries disclosing dyes and DIAGNOdent, reported marked variability in accuracy.[41] Radiographic detection of pit and ssure caries was found to a high percentage (25%) of false positives. A sharp explorer missed 25% of the caries and when the use of the explorer indicated that caries was present, the diagnosis was wrong 12% of the time (false positives). Disclosing dyes were found to be the least accurate detection technique, missing 40% of the caries present and having 20% false positives. Laser uorescence was the most accurate technique, accurately diagnosing carious lesions 90% of the time while giving no false positives.

Some concern has been raised with regard to sealing over of undiagnosed, incipient carious lesions on the occlusal surface. In 1972, Handelman reported on sealing active caries in pits and ssures to determine if this procedure was harmful.[42] He placed sealants over diagnosed, active, occlusal carious lesions to evaluate the e ects. His two-year analysis noted that "preliminary

Table 1:

CONSIDERATIONS FOR PREMATURE SEALANT FAILURE

- **Partially erupted tooth**
- **Poor isolation**
- **Occlusal parafunctional habits** (wear of sealant)
- **Patient behavioral problems**
- **Age of patient** (very young patients, difficult to effect adequate isolation and patient behavioral issues)
- **Enamel structural defects** (amelogenesis imperfecta, dentinogenesis imperfecta)

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clinical and radiographic ndings suggest that there was no progression of the carious lesions".[43] Other workers subsequently con rmed Handelman's ndings.[44,45] erefore, based upon the evidence to date, placing sealants on at-risk teeth is a cost-e ective technique while sealant placement over active or incipient carious lesions does not appear to be detrimental.

Fig. 7a: Light curing sealants for 10 seconds.

Fig. 7b: Sealants after light curing.

Types of Sealants

Sealant materials can be classi ed in various ways but the commonest classi cation scheme is on the basis of composition. Currently there are two basic sealant types: resin and glass ionomer. is article focuses on resin-based sealants because the preponderance of clinical data supports their clinical use. (Table 2) At the current time, the published literature indicates that clinical retention of resin-based sealants is superior to that of glass ionomer-based sealants.[46]

Resin-based sealants can be classi ed in a number of di erent ways, typically polymerization method, lled or un lled, colored or clear, and color-changing upon polymerization and moisture tolerant. e vast majority of resin-based materials cure or polymerize by a free radical reaction with the reaction being initiated by a tertiary amine (the so-called chemically cured, autocuring or self-curing materials) or by initiating free radical generation with a visible light curing device. While there are certain di erences in the properties of the cured resins and in clinical technique when using these two classes of material, both self-cure and light-cure sealants appear to provide equivalent clinical effectiveness when applied to etched dry enamel.[28-32] Pit and ssure sealants also can be lled or un lled and the ndings of clinical trials indicate that un lled sealant performs better than lled sealants.[8] Likewise, sealants can also be clear or colored, the latter o ering the advantage of visual con rmation of the presence or absence of sealant on a tooth surface.

More recently, dental manufacturers have introduced sealants that change color during polymerization, e.g. Clinpro Sealant (3M-ESPE) and Helioseal Clear Chroma (Ivoclar Vivadent). e Helioseal Clear Chroma changes from clear to green after photo-polymerization, a color change that should be bene cial in evaluating sealant placement and subsequent sealant retention. e Clinpro Sealant has a pink color when applied and converts to a white opaque mass after light curing. Although, at present, polymerization-associated color change of a pit and ssure sealant may be bene cial in ensuring adequate sealant placement, it may be of limited usefulness for subsequent assessment of sealant retention.

In some cases the manufacturers have added ll-ers to resin sealants that contain uoride (Delton Plus, Dentsply; HelioSeal F, Ivoclar Vivadent) but there is no clear data on the availability of the uoride in preventing recurrent caries at the margins of the sealant.

As described earlier, the newest category of resin based sealant is moisture tolerant (Embrace WetBond, Pulpdent). is class of sealant seems to have provided a much needed chemistry and physical properties to increase sealant success. e available information at the present time suggests that the optimal characteristics for a pit and ssure sealant are a resin-based material that is moisture tolerant, light-cured, is

Table 2:
PARTIAL LISTING OF RESIN SEALANTS

Clinpro Sealant	3M-ESPE
Conseal F	SDI
Delton	Dentsply
Delton FS	Dentsply
Delton Plus	Denstply
Embrace WetBond	Pulpdent
Enamel Loc	Premier
Fissurit	Voco
FluroShield	Dentsply
Guardian Seal	Kerr
HelioSeal	Ivoclar Vivadent
HelioSeal Clear Chroma	Ivoclar Vivadent
HelioSeal F	Ivoclar Vivadent
Seal-Rite	Pulpdent
Sealant	Bisco
Virtuoso Sealant	Den-Mat

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Fig. 8: Evaluating the sealant with an explorer. Dentistry by Dr. Christopher Ramsey.

lightly lled with color so that sealant detection and evaluation at recall is possible. Embrace WetBond ful lls these clinical needs.

Clinical Technique

When sealants are placed on the occlusal surfaces of posterior teeth, they can interfere with the occlusion. For the child with a transitional dentition, these minor occlusal interferences are not problematic. However, for the adolescent and young adult with a fully erupted permanent dentition, these occlusal interferences can create retention problems. In order to avoid any problems and to increase the retention of the sealant it is important that the following be done:

For fully erupted dentitions, check the occlusion with articulating ribbon to evaluate any potential occlusal interferences. If the tooth has occlusion in the areas where the sealant placement and retention is desired, it is recommended that a ssurotomy be performed to create additional space for thickness of the sealant to increase retention.[14, 47, 48]

Sealant should be applied to cover the cusp ridges to a thickness of at least 0.3 mm. [14, 47, 49]

Although the clinical use of pit and ssure sealants is relatively straightforward, it is felt that a review of the entire procedure may be helpful. To this end, an actual clinical case is discussed:

1. Examine and evaluate the occlusal surfaces to be considered. In this particular case (Fig. 3), based upon the morphology of the pit and ssures, sealants were to be placed on the maxillary rst and second premolar and the rst molar.

2. Once a diagnosis has been made and it has been determined that a sealant is to be placed, the tooth must be isolated. Isolation of the eld can be accomplished with a dental dam or by using absorbents that are changed frequently between steps.

3. Following isolation of the tooth or teeth, the tooth surfaces must be cleaned. For this patient, a water-pumice paste contained by a prophylaxis cup in a slow speed handpiece was used. e adhesion of sealant to enamel surfaces can be enhanced by cleaning the occlusal surfaces with a non- uoride, pumice prophylaxis paste[50] or by using an air abrasion device.[51]

4. After cleaning, the teeth surfaces were thoroughly rinsed with an air-water spray. e teeth were then dried and isolated with a Dri-Angle (Dental Health Products, Inc.) in the buccal vestibule.

5. Following prophylaxis and drying, the teeth were etched for 15 seconds with a phosphoric acid etchant (Etch-Rite, Pulpdent) (Fig. 4). e etchant was then thoroughly rinsed from the teeth with an air-water spray for 10 seconds, followed by very light drying of the treated surfaces. With Embrace WetBond, the typical dull, frosted appearance of the etched surface is not desired. Rather, the surface should be very slightly moist and have a slight glossy appearance (Fig. 5). One method of creating this slightly moist surface is to dry the enamel using a cotton pellet to remove the excess moisture and continue with the application of Embrace WetBond sealant.

6. Sealant was then applied to the occlusal surfaces using the canula tip supplied by the manufacturer (Fig. 6). After dispensing, the sealant was placed to cover all pits and ssures and to extend onto the cusp ridges using a brush type applicator. e nal sealant thickness upon application should be at least 0.3mm.

7. After application, the sealants were light cured for 10 seconds (Fig. 7).

8. e sealant is then evaluated for retention and seal of the occlusal surfaces (Fig. 8).

It should be noted that, although the most common practice is to apply the pit and ssure sealant directly to the etched enamel, various studies have evaluated the ef cacy of using an intermediate adhesive resin before sealant placement. e use of an intermediate adhesive resin has the potential to increase sealant retention[52, 53] although the disadvantage with this procedure is that it increases the number of steps and time required for sealant application. Not only does the greater number of steps result in an increased cost in terms of time and materials, there is an increased potential for contamination when treating a pediatric patient, possibly resulting in premature loss of the sealant.[46]

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CONCLUSIONS

Sealants are a highly e ective preventive measure for reducing pit and ssure caries. Simonsen's comprehensive review of the dental literature[46] covered 1,465 papers from 1971 to 2001 and included the following subheadings: laboratory studies; clinical technique and tooth preparation; etching time; auxiliary application of pit and ssure sealant; retention and caries prevention; uoride used with sealants and uoride-containing sealants; glass ionomer materials as sealants; options in sealants: lled vs. un lled; colored vs. clear; autocure vs. light-initiated; sealants placed over caries in a therapeutic manner; cost e ectiveness of sealant application; under-use of pit and ssure sealants; the estrogencitity issue; use of an intermediate bonding layer to improve retention; new developments and projections; and summary and conclusions. He concluded from this examination of peer-reviewed publications that sealants are safe, e ective and underused in the United States.

e introduction of a moisture tolerant resin based sealant such as Embrace WetBond will eliminate some of the problems seen in the past with typical resin-based sealants. In a dental practice, pit and ssure sealants are best applied to high-risk populations by trained auxiliaries utilizing an etch-and-rinse technique and a moisture tolerant sealant. Adherence to the technique described in this article will lead to success in preventing pit and ssure caries with sealants.

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CUT ALONG DOTTED LINE

1. Caries on the occlusal and buccal/lingual surfaces of teeth account for what percentage of the caries experienced by children and adolescents?
A. 20%
B. 40%
C. 60%
D. 90%

2. Sealant retention to buccal and lingual pits and fissures of molars compared to occlusal pits and fissures is:
A. considerably lower
B. the same
C. considerably higher
D. has never been evaluated

3. Difficult-to-seal teeth include all the following EXCEPT:
A. the fully erupted premolar
B. the partially erupted permanent first molar
C. the partially erupted permanent second molar
D. the partially erupted premolar

4. For typical sealants, it is important to isolate the tooth to be sealed and to have the enamel clean and dry. Embrace WetBond is a unique etch and rinse sealant in that it:
A. is moisture tolerant and can be placed successfully on moist, etched enamel surfaces
B. requires and extra dry dentin surface
C. requires extra primers to bond
D. can only be used on erupting molars

5. A-two year study with Embrace WetBond sealant demonstrated:
A. 50% retention of the sealant
B. no teeth recalled in the study had occlusal caries
C. only 55 teeth out of over 1,100 had to have the sealant replaced or repaired
D. b and c

6. The chemistry of Embrace WetBond is different from traditional sealants in that
A. it uses a hydrophilic resin
B. incorporates di-, tri, and multi-functional acrylate monomers that creates an integration with the tooth when moisture is present
C. acts synergistically with the moist etched enamel surface to allow the spread of the sealant
D. all the above

7. Caries diagnosis for pits and fissures using a sharp explorer has been discarded in recent years in favor of:
A. radiographic evidence
B. visual changes in the appearance of enamel
C. new diagnostic devices
D. all the above

8. Three different variations in the appearance of pits and fissures in cross section include all the following EXCEPT:
A. V-type
B. U-type
C. S-type
D. I-type

9. In the seven year study by Mertz-Fairhurst and co-workers, there was a report of 66% complete sealant retention. Caries reduction rates of sealed versus unsealed teeth was:
A. 25%
B. 40%
C. 55%
D. 95%

10. Based on a review of published sealant data, one can expect what percent of sealant loss per year?
A. 5-10%
B. 20-25%
C. 40-45%
D. 60-65%

11. DIAGNOdent is a diagnostic device for assessing the presence or absence of pit and fissure caries. DIAGNOdent is a:
A. fiber optic transilluminator
B. portable digital x-ray device
C. laser fluorescence device
D. electronic explorer

12. Clinical success with sealants is based upon:
A. technique
B. fissure morphology
C. characteristics of the sealant
D. all the above

13. All the following are types of sealants EXCEPT:
A. colored sealants
B. self-cure sealants
C. light-cure sealants
D. heat cured sealants

14. When placing a sealant, the adhesion to the enamel surface can be enhanced by cleaning the occlusal surface with:
A. a non-fluoride, pumice prophylaxis paste
B. an air abrasion device
C. alcohol on a cotton roll
D. a and b

15. According to this article, the tooth is etched for:
A. 15 seconds
B. 30 seconds
C. 45 seconds
D. 60 seconds

16. Embrace WetBond sealant is enhanced when applied to a slightly moist surface. A technique for creating this slightly glossy, moist surface described in the article is:
A. Dry the tooth off until it is chalky in appearance then flood the tooth with water
B. Remove excess water from the tooth with a cotton pellet
C. Paint water on the surface with a disposable brush until it pools in the pits and fissures
D. None of the above

17. TRUE or FALSE: In cases where the dentition is fully erupted and sealants are indicated, it may be necessary to perform a fissurotomy in the pits and fissures to create room for a thickness of sealant to be successful.
A. True
B. False

18. The sealant should be placed to cover all pits and fissures and extend onto the cusp ridges. The sealant should be applied to a minimum thickness of:
A. 0.1 mm
B. 0.3 mm
C. 1.0 mm
D. 2.0 mm

19. Some sealant manufacturers recommend the use of an additional step with a separate intermediate adhesive resin. A disadvantage of doing this when compared to any potential benefits is:
A. It is more costly because it requires an additional bottle of reagent
B. It is more costly because it requires more time for application of the sealant.
C. It increases the number of steps which can lead to the potential for contamination during the procedure.
D. All the above

20. TRUE or FALSE: Sealants are a highly effective preventive measure for reducing pit and fissure caries.
A. True
B. False

CUT ALONG DOTTED LINE

Pit & Fissure Sealants

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NOTE: We recommend that you photocopy your answers before mailing this course. is will ensure that you have a record of your course completion in case of loss due to postal system error.

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