Sealants: The Added Link in Prevention

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Conflict of Interest Disclosure Statement

- Richie Kohli does not have any conflict of interest associated with this course. She has no relevant financial relationships to disclose.
- Joan Ellison does not have any conflict of interest associated with this course. She has no relevant financial relationships to disclose.
- Dr. Jeanette MacLean has received speaking honoraria from GC America to provide continuing education lectures in the past.

Introduction – Pit & Fissure Sealants

Dental caries, a multifactorial disease continues to be prevalent among children and adolescents, particularly in underserved populations. According to the data collected from the 2015-2016 National Health and Nutrition Examination Survey, the prevalence of total dental caries (untreated and treated) in primary or permanent teeth among youth aged 2–19 years was 45.8% with the prevalence increasing with age. Disparities existed with socioeconomic factors such as race and economic status.[1] Pit and fissure sealants have been used for many years as an effective and integral component of a preventive dentistry care plan. Despite early controversy regarding effectiveness, safety and retention rates, pit and fissure sealants have been used to prevent occlusal caries in children and adolescents. However, this effective intervention has been underused, with socioeconomic factors being the main barriers.[2] Two main types of sealants, resin based and glass ionomer, provide clinicians with several variations and options for application. Public health and school-based sealant programs have been effective in reaching underserved populations. On-going research continues to support the use of pit and fissure sealants compared to no sealants as an effective means of preventing dental caries in children and adolescents.[3]

Course Contents

Overview

This course presents an overview of dental pit and fissure sealants as a safe and effective way to prevent dental caries. The course starts with a brief look at the history of dental sealants followed by the current rationale for their use. Frequently asked questions about sealants are addressed along with the presentation of guidelines for sealant use. Information about materials currently used for sealants is presented along with general instructions for the successful placement of sealants. The use of sealants in public health programs is also addressed.

Learning Objectives

Upon completion of this course, the dental professional should be able to:

- Describe the current findings and recommendations on the effectiveness and safety of pit and fissure sealants.
- Discuss why the use of pit and fissure sealants has been controversial.
- List and identify the different natural occlusal characteristics of human teeth that could benefit from sealant placement.
- Describe the proper steps in sealant placement.
- Discuss different types of sealant materials and their effectiveness.
- Discuss the use of pit and fissure sealants in public health programs.
- Use high quality evidence for health care decision making.

History of Sealant Use

Protecting the natural pits and fissures of newly erupted teeth from dental decay is not a new concept. There have been numerous references to reducing the decay susceptibility of pits and fissures since 1923 when H. T. Hyatt suggested a technique called prophylactic odontonomy. Subsequent approaches have used various materials and chemicals.

A breakthrough came in 1955 with Buonocore's "acid-etch technique" which allowed for sufficient bonding between the resin material and enamel.

The acid-etch technique offered promise for the one area of the human tooth that was particularly susceptible to dental caries. By 1955 there was a sufficient amount of research to support the use of fluoride in public water systems and topical application by dental professionals. Along with the use of fluoride, it was widely recognized that the reduction of fermentable carbohydrates in the diet, routine dental examinations, routine dental care, and the daily removal of plaque from the teeth reduced the incidence of tooth decay. At the same time it was apparent that the pits and fissures that form the occlusal surfaces of the human teeth remained vulnerable. Acid-etch technique provided the basis for further development of effective materials to seal the pits and fissures and thus dental sealants offered an added link in preventive dentistry.

In 1983 the National Institutes of Health published a report entitled, "*Consensus Development Conference Statement on Dental Sealants in the Prevention of Tooth Decay*." This report recommended the use of pit and fissure sealants as a safe and effective method of preventing pit and fissure decay. In addition, it addressed significant roadblocks to sealant use such as availability, insurance coverage, and questions of enamel maturation.

Following the publication of this report, many states changed their dental practice acts to allow dental auxiliaries to place pit and fissure sealants. Currently all state practice acts allow dental hygienists to place pit and fissure sealants, and the majority of states allow dental assistants to perform this procedure. This information also resulted in many dental insurance companies looking at sealant placement not as an experimental procedure but as a cost-effective prevention measure.

Continued review of the dental literature indicates ongoing documentation of successful sealant retention rates, reduction of occlusal caries, and the economic impact of a caries-free population. Both public health programs and private practice surveys give positive results for the placement of pit and fissure sealants.

An added benefit of placing pit and fissure sealants is the positive dental experience it provides for children. Almost without exception, the placement of pit and fissure sealants is painless and non-traumatic. Pit and fissure sealants provide both primary prevention by averting the onset of caries and secondary prevention by averting the progression of early caries to cavitation.

Rationale and Patient Selection

Epidemiological investigations confirm that although occlusal surfaces make up 12% of the tooth surfaces in the mouth; approximately 90% of caries in permanent teeth occurs in the pit and fissures. Further, caries in pit and fissures increase dramatically in permanent teeth between the ages of 11 and 19.[1] The deep developmental pits and fissures on the occlusal surfaces predispose them to carious lesions. Unlike smooth surfaces, occlusal surfaces receive little protection from fluoridated water and topical fluoride application. Pit and fissure sealants act as a physical barrier between the occlusal fissures and the oral environment, preventing the food debris and ingress of bacteria. According to a Cochrane systematic review conducted in 2017, pit and fissure sealants reduced caries between 11 and 51% compared to no sealant when measured after 24 months. Similar outcomes were found at specific points up to 48 months.[3] A systematic review conducted by Wright et al (2016) reported up to 80% reduction after 2 years.[4] Numerous studies[4,5] have been conducted citing success rates and clinical protocols for sealant use. Many cite similar principles and scientific theories that underlie the use of pit and fissure sealants in private and public programs including the following:

- Dental caries on occlusal surfaces of posterior teeth among children and adolescents that may continue into adulthood is considered a worldwide problem.
- Pit and fissure sealants prevent the growth of bacteria promoting occlusal caries formation and can arrest caries progression.
- For equivalent outcomes, the least invasive approach, using the simplest intervention for managing dental caries, is preferred.
- Minimizing the cost of preventing or controlling pit and fissure caries is desirable.
- Strategies for sealant use (e.g., patient selection, clinical decision making) may differ between individual care and community programs.
- Sealants have been demonstrated to be a safe and effective long-term method to prevent pit and fissure caries.
- Long term effects of sealant placement is often dependent upon parental motivation and the presence of a dental home for the patient.

Systematic reviews of evidence based clinical recommendations for the use of pit-and-fissure sealants as a useful resource in making evidence-based decisions about sealant use.[4] These recommendations are not a standard of care, but should be integrated with the practitioner's professional judgment and the individual patient's needs and preferences.[3]

Treatment considerations for patient use in private practice differs somewhat from guidelines used in community sealant programs. Those seeking treatment in private practice settings are more likely to have continuous care, comprehensive diagnoses, and treatment options. People treated in community sealant programs are more likely to be episodic users of primary dental care services.

Risk assessment techniques for dental caries are useful in determining which patients would most likely benefit from the protection provided by the sealant. Tooth morphology, caries history, family history, home care, history of dental care, and eruption schedule (age) all play a role in selecting this procedure for a patient.

In spite of the high prevalence of preventive dentistry therapies, there is an unequal caries experience (treated and untreated) among 2-19-year-old children by ethnicity and family income level, with Hispanic children and those from lower income level families having the highest rates.[1] To improve this situation, dental health professionals should promote proper oral health practices and encourage sealant application to permanent teeth as early as possible, especially in those children who have had caries in their primary dentition.

As noted above, tooth morphology plays a role in selecting specific teeth for pit and fissure sealants. The photograph of a normal first mandibular molar shows the natural occlusal morphology that tends to make cleaning difficult and creates areas for food impaction (Figure 1). It also illustrates a less than ideal situation for diagnosis of incipient lesions. The following photographs, which show the anatomy of the tooth surface in detail, further illustrates the need to seal these types of fissures (Figures 2-4).

It has been well-documented the tooth surface is constantly undergoing a remineralization and demineralization process.

Figure 1. Normal first mandibular molar.

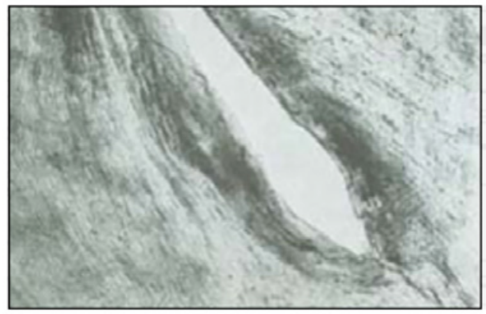


Figure 2.

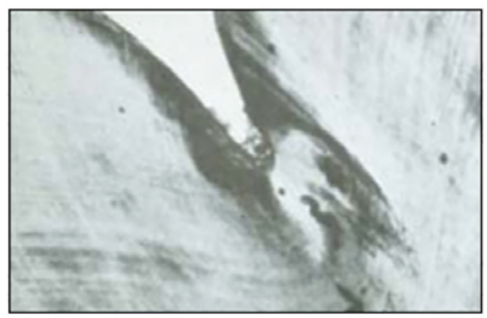


Figure 3.

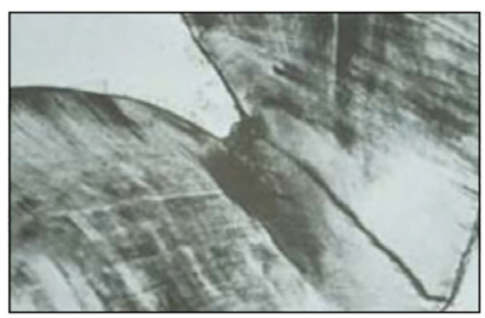


Figure 4.

Types of Pit and Fissure Sealants

Resin-based sealants

Resin-based sealants (RBSs) are cured with visible light. When using light cured materials, it is very important that the curing light is of high quality and is tested frequently for the value of the light emitted. The majority of RBSs are not fluoride releasing, resin is hydrophobic, and their application is more technique sensitive (moisture concerns). If the tooth surface cannot be kept free of moisture contamination from saliva, blood, or water, RBSs should not be used. Contamination of resin will lead to more rapid marginal leakage and sealant failure. Over time, acid can contribute to marginal breakdown and microleakage under the sealant, which can contribute to decalcification and cavitation underneath. Retention loss of RBSs is associated with the risk of developing caries.[6] Some RBSs claim to release fluoride, but the fluoride release is minimal at the initial placement, and does not continue over time because fluoride ions are incapable of moving through chemically inert resin. In the mid-1990s safety concerns were expressed regarding leaching of bisphenol-A (BPA) from the sealants and a possible estrogenic effect. However, studies have concluded that the short term risk of estrogenic effects from treatments using BPA resins is insignificant and that BPA released orally may not be absorbed at all or may only be present in nondetectable amounts in the systemic circulation.[7,8]

Dental material manufacturers offer a variety of resin-based sealant materials designed to meet the preferences of individual operators. These products include sealant materials that are unfilled, filled, opaque, clear, colored, and products that change color when cured. Convenient unit-dosed material is also available. There appears to be no difference in the retention rate. The filled materials are often easier to see and monitor, but the clear materials allow the operator to continue to see the fissures. Sometimes operators prefer the colored sealants to make monitoring retention easier. Patients and parents should be consulted prior to the placement of colored sealants. The dental personnel should be aware of the filler content in the sealant being utilized. The higher the percentage of filler, the more important it is to check and adjust the occlusion when the sealant is high in occlusion.[9] It is very important that the curing light penetrates the sealant being placed to ensure maximum polymerization.

Glass Ionomer Based Sealants

Glass ionomer cement sealants (GICs) are hydrophilic (moisture tolerant)and have fluoride releasing properties. The fluoride is released from the sealant after polymerization, and continues to slowly release over time for up to 8 years . GICs auto-cure as the result of an acid-base chemical reaction between a liquid, commonly polyacrylic acid, and a powder comprised of minerals including silicon oxide, aluminum oxide, and calcium fluoride. Low viscosity glass ionomer cement (LVGIC) wears more rapidly over time in comparison to RBSs or high viscosity glass ionomer cement (HVGIC). However, loss of complete retention of GICs is not associated with the risk of developing caries because small particles remain in the bottoms of fissures that act as a fluoride reservoir enhancing nearby enamel remineralization.[6] The thinner consistency of LVGICs flows nicely into pits and fissures, thicker HVGICs requires more adaptation into the anatomy of the tooth. Both can be adapted to the tooth with a damp cotton swab or finger press. HVGIC is durable and wear resistant, making it a good material choice to improve retention, if desired. GICs chemically bond to enamel and dentin without the need for an intermediate agent, such as bonding agent. The use of a surface conditioner, typically 10 – 20% polyacrylic acid, removes the smear layer and is recommended to improve chelation and enhance the chemical bond between the GICs and the tooth surface.[10] Resin-modified glass ionomer (RMGI) will not remineralize as well as a pure GICs, but its photopolymerizable ionomers allow it to be light-cured.[3] Resin-modified glass ionomers (RMGI) undergo more wear than pure resin sealants. However, there is evidence of residual RMGI retention in the deepest portions of the pit and fissure, with sustained fluoride release. Recent studies show little difference in overall caries prevention, however, more conclusive research is needed.[3,11]

Sealant Utilization Considerations

Multiple studies confirm the reduction of pit and fissure carious lesions with the placement of sealants, but sealant placement continues to be underused. Some of the same questions that were brought up when sealants were first introduced continue to be concerns even as scientific evidence supporting the use of sealants continues to grow. It is possible these considerations are responsible for the under-utilization of this proven preventive procedure. The following list includes some common questions that continue to be asked regarding the use of pit and fissure sealants:

Sealing Incipient Lesions - Do the Caries Continue to Progress?

Research findings consistently indicate the caries process is inhibited when sealants are applied to incipient lesions. These findings have been demonstrated radiographically and microscopically. A systematic review by Griffin et al., 2008[12] examined the effectiveness of sealants in preventing caries progression and found that the median annual percentage of non-cavitated lesions progressing was 2.6% for sealed and 12.6% for unsealed carious teeth. They concluded that sealing non-cavitated caries in permanent teeth is effective in reducing caries progression. The intact sealants provide "100% protection" in preventing caries. The percent of progression of carious lesions increase minimally over time as sealant integrity was compromised. Despite this good evidence, a recent survey on dentists' perspectives on evidence based recommendations suggested that the U.S. dentists have not adopted evidence-based clinical recommendations regarding the sealing of non-cavitated caries lesions (NCCLs).[13] According to practice guidelines published by the American Dental Association in 2018, experts recommend the use of sealants plus 5% sodium fluoride varnish applied every 3-6 months or sealants alone, versus fluoride varnish only.[14]

Retention Rates - What if the Sealant Falls Out?

While placing sealants, steps need to be taken that enhance sealant retention such as having a very dry field for RBSs, or, instead, consider utilizing hydrophilic GICs. RBSs retention is principally the result of resin tags penetrating the microporosities that occur when enamel is etched properly and the field is dry. In general, properly placed sealants do not fall out. In a systematic review by Griffin et al., 2009, it was found that surface cleaning with toothbrush and assistance during sealant placement may result in higher retention.[12] Cochrane Database of Systematic Review[3] evaluating caries prevention by sealants concluded, the reduction in caries ranged from up to 51% in 12 months with similar results at 48 months. If the occlusal bulk wears away or is lost, there is clinical evidence the resin tags remain and the surface is protected. The photograph in (Figure 5) shows a sealant with the tooth structure dissolved leaving only the resin tags.

Figure 5. Sealant with the tooth structure dissolved.

Loss of GICs is not associated with the risk of developing caries because small particles remain at the bottom of fissures acting as a fluoride reservoir and enhancing nearby remineralization.

Griffin et al., 2009 in a systematic review reported that teeth with fully or partially lost sealant were not at a higher risk of developing caries than were teeth that had never been sealed.[12] Inability to provide a retention-check examination to all children participating in school sealant programs because of loss to follow-up should not disqualify a child from receiving sealants.[12] Further, a 2014 study by Fontana et al15 suggested that occlusal surfaces without frank cavitation that are sealed with a clear sealant can be monitored with International Caries Detection and Assessment System (ICDAS), quantitative light-induced fluorescence (QLF), or DIAGNOdent, which may aid in predicting the need for sealant repair.

Etching Removes Enamel – Will the Unsealed Etched Surface be More Susceptible to Caries?

Remineralization begins as soon as saliva coats the surface and forms an organic pellicle over the etched tooth structure; thus, the tooth surface is protected. For reference, the etching process used for sealants removes about 10 microns of enamel and polishing with pumice removes about 4 microns.

Cost Effectiveness - Do You Save Money?

For years, average cost of a one-surface amalgam restoration has remained about double the cost of a sealant. Studies suggest sealants are cost-effective, particularly in children at increased risk for tooth decay.[16,17] Having auxiliaries perform this procedure can also reduce the cost. Placing sealants at the time of the recall appointment and using a risk assessment protocol to determine which surfaces to seal are also ways to reduce cost.

Removing Tooth Structure – Is it Necessary?

Using a bur to clean out pits and fissures prior to the placement of a composite resin or RBSs sealant is known as a preventive resin restoration (PRR). While some providers may continue this approach, it is no longer supported by current caries research, akin to other antiquated clinical techniques such as "extension for prevention." Non-cavitated occlusal surfaces do not require removal of tooth structure and sealed incipient caries lesions will arrest. According to the 2015 International Caries Consensus Collaboration, representing 21 global experts in cariology, "The failure to follow new evidence is not limited to dentists who are "out of touch," do not undertake continuing professional development, or have been practicing for many years; in some countries and some schools, new dentists are still taught to remove all infected carious tissue, and it is actually not possible to pass professional examinations without demonstrating this. The reasons underlying this failure to translate evidence into clinical practice are many and complex."[18] Air abrasion is sometimes used to clean out pit and fissures prior to placement of sealants. Many states interpret the use of air abrasion as removal of hard tooth structure and, therefore, not all auxiliaries will be allowed to place the sealant materials. Labor is a major cost in the dental office; it is more effective to use qualified auxiliaries.

Payment - Do Insurance Companies Cover this Procedure?

Medicaid coverage in all 50 states covers the placement of pit and fissure sealants. Most Health Maintenance Organization's dental plans cover sealants as a preventative procedure. Also, many of the fee for service plans cover sealants because they have determined the use of sealants is a cost effective method of preventing higher cost restorative treatment. The Centers for Medicare and Medicaid Services (CMS) national oral health goal is to increase the rate of sealants in the Medicaid/ Children's Health Insurance Program (CHIP) population.

Technique

Dentists, dental hygienists, and, in many states, dental assistants can place sealants. State practice acts make the determination as to who can diagnose, supervise, and place sealants. Many states require some type of educational program, sometimes with a laboratory as well as a clinical program, to qualify auxiliaries to place sealants. Placing sealants is not without problems. New materials and improved dental equipment has certainly made the application procedure easier and more successful. Potential problems start with the age of the patient. Many 6 - to 7 year olds have never had a dental procedure outside of examinations and cleanings. This procedure should be as pleasant as possible. This might be the introduction of dentistry to a child and if the least bit traumatic, could set a pattern for life.

Procedures for Pit and Fissure Sealant Placement

Procedures for pit and fissure sealant placement may vary based on type of sealant and manufacturer. Referring to the manufacturer's instructions is recommended before proceeding.

Tray Set Up

Prior to the start of the procedure, a tray with all necessary instruments, supplies, and equipment should be prepared. The items listed below are included in the sample tray set-up (Figure 6). Each operator needs to determine what should be included on the tray based on personal preferences and the sealant material being used.

Figure 6. Tray set-up.

Mirror	Syringe Tip
Explorer (No. 5)	Slow Speed Handpiece
Cotton Pliers	Toothbrush
Isolation Device such as cotton rolls or other substitutes	Material Directions
Saliva ejector	Curing Light
	Articulating Paper

The following pages will outline procedural steps for resin-based sealants and glass ionomer cement sealants.

Resin-Based Sealant Procedure

Step One – Clean the Tooth Surface
The tooth surface must be thoroughly cleaned prior to the placement of the sealant. Cleaning can be accomplished using hydrogen peroxide, a toothbrush, a prophy cup or brush, or a prophy jet. Products containing fluoride and/or glycerin are contraindicated and should not be used to clean the tooth. After cleaning, the surface should be rinsed approximately 20 seconds. An explorer should then be used to examine the entire tooth surface for any remaining debris and previously undetected pathology (Figures 7 8). If debris remains, the tooth surface should be cleaned again. If pathology is detected, the decision to seal the tooth should be reevaluated.

Figures 7-8.

Step Two – Isolate the Tooth Surface
Isolation is the most critical issue in the proper placement of resin-based sealants. If the surface of the etched tooth is contaminated by saliva, the resin material will not adhere because the remineralization process begins as soon as saliva touches the etched surface. Sealant loss and immediate failure of retention are most often linked to moisture or salivary contamination. A rubber dam is the ideal method for tooth isolation for RBSs sealants, but it is not always possible or appropriate for young children. Cotton rolls, dry field pads, dry field kits, suction isolation systems, and single tooth isolation are all used with success. Figure 9 illustrates acceptable isolation methods.

Figures 9. Isolation Methods

Step Three – Etch the Tooth Surface
Etching the surface of the tooth is accomplished by using 38% phosphoric acid. The acid use in etching the tooth has the additional benefit of killing the bacteria in the pit and fissures. This acid is available in liquid and gel. If a gel is used, it is important to use a gel product that is specifically designed for pit and fissure sealants. Other gels may be too viscous and will not flow properly into the pits and fissures. The etching time is approximately 20 seconds for both primary and permanent teeth (a minimum of 15 seconds and maximum of 60 seconds). Figures 10-11 illustrate the placement of acid on the tooth surface. Use extreme caution when handling phosphoric acid etch to avoid any contact with the skin. Be cautious of splatter or etch getting on gloves, a rubber dam, suction tip, or other item that might accidentally contact the skin, which could cause a chemical burn. If phosphoric acid accidentally contacts the patient's skin, rinse with copious amounts of water and inform the parent or guardian to watch for signs of skin irritation.

Figures 10-11.

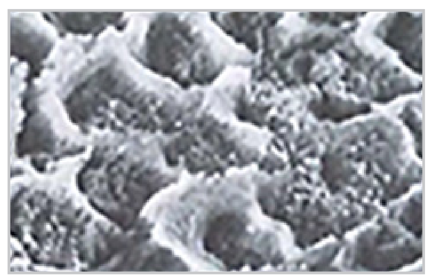
Step Four – Rinse and Dry the Tooth Surface
After etching for at least 15 seconds, the surface needs to be rinsed with water to remove the acid. Suction and air should be used to thoroughly dry the etched tooth surface. Again, it is extremely important to avoid salivary contamination. If the tooth surface is contaminated by saliva, it will be necessary to repeat the etching process, this time etching for 5 seconds (Figures 12-13).

Figures 12-13.

- A properly etched surface will appear chalky (Figure 14).

Figures 14. Properly etched surface.

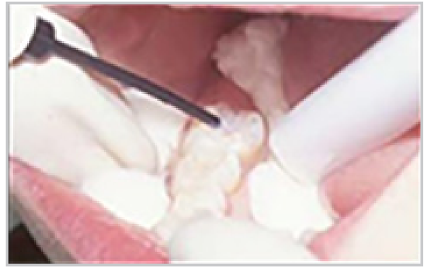
- A microscopic view of an etched tooth surface (Figure15).



Figures 15 - Microscopic view.

Step Five – Apply the Bonding Agent/Primer (Optional)
Place a thin layer of bonding agent, gently thin bonding agent with air; cure according to manufacturer's instructions. This step is optional. Some manufacturers will recommend the use of a bonding agent to increase the retention of the sealant.

Step Six – Apply the Sealant Material
It is important to be familiar with the particular sealant material being used. Some clinicians find it helpful to place a photocopy of the manufacturer's instructions on the tray set-up and review them before beginning the procedure. Sealant material is placed on the prepared tooth using a syringe (Figure 16). Regardless of how it is delivered, it is important to limit the amount of material. The sealant material should be placed only in the pits and fissures. Too much material can result in occlusal interference. Over manipulation of the product may result in bubbles. Although occlusal interference is not a major concern, the amount of material should also be limited when sealing pits and fissures on lingual and buccal surfaces.

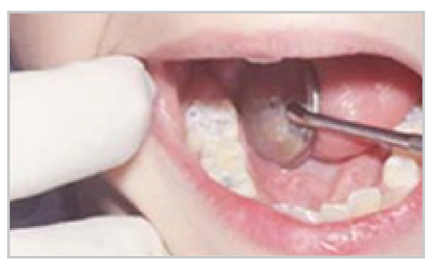


Figures 16 - Placing sealant material with syringe.

Step Seven – Curing the Sealant
After the light cured sealant material is applied and the operator is satisfied all surfaces are coated using the correct amount, the sealant should remain undisturbed for 10-20 seconds before applying the curing light. This delay allows the resin to flow into the etched surface. Light cure for the amount of time indicated in the manufacturer's instructions, typically 20 seconds. The tip of the curing light wand should be held approximately 3 to 5 mm from the surface of the sealant (Figure 17).

Figures 17 - Curing light wand positioning.

Step Eight – Evaluate the Sealant
Immediately after the material has cured the sealant should be evaluated for retention, flaws, and occlusion. Use an explorer to check for retention and flaws. If a sealant is going to fail, it most likely will do so immediately. If there are bubbles, voids, or any portion of the material comes out, more sealant material may be added. It will be necessary to re-isolate and etch before placing the material again. The occlusion of the sealant should be checked with articulating paper (Figures 18-19). If there is any indication of interference, the excess sealant material should be removed using a round finishing bur in a high or slow speed handpiece.



Figures 18-19.

Some additional recommendations:
- Treat one quadrant at a time
- Use of an assistant and four-handed dentistry can expedite the process and help ensure proper technique, particularly when isolation is critical.
- Patient and clinician should wear safety goggles.

Glass Ionomer Cement Sealant Procedure

Step One – Clean the tooth with plain pumice, and then rinse with water (Figure 20).

Figures 20.

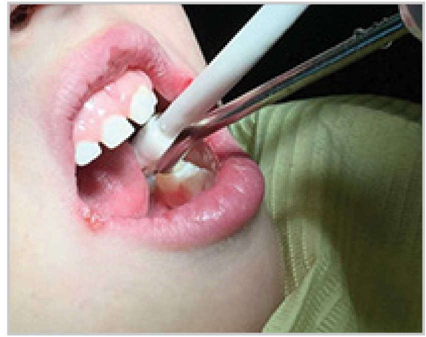
Step Two – Apply 20% polyacrylic acid cavity conditioner for 10 seconds with a microbrush (e.g., Cavity Conditioner, GC America) Figures 21 and 22.

Figures 21-22

Step Three – Rinse off the conditioner with water (Figure 23).

Figures 23.

Step Four – Suction/gently dry the tooth to remove excess or pooling water, but do not dessicate (Figure 24).



Figures 24

Step Five – Tap the GIC sealant capsule on its side to loosen the glass particles (e.g., Fuji TRIAGE, GC America) (Figures 25 and 26).

Figures 25-26

Step Six – Activate the glass ionomer cement sealant capsule by firmly depressing the colored plunger on the bottom of the capsule against the countertop. Hold down for two seconds (Figures 27 and 28).

Figures 27-28

Step Seven – Mix the capsule for 10 seconds in a capsule mixer (Figure 29).

Figures 29

Step Eight – Place the capsule into the applicator gun and click 2-3 times to move the material up towards the tip (Figure 30).

Figures 30

Step Nine – Immediately apply the material to the tooth's pits and fissured grooves with the capsule applicator (Figure 31).

Figures 31

Step Ten – Quickly adapt the GIC to the tooth with a damp microbrush or cotton tip application. Alternatively, GICs can be applied with a gloved finger and pressed onto the teeth. Do not manipulate the material beyond its working time (Figure 32).

Figures 32

Step Eleven – Allow the material to auto-cure for 2 and 1/2 minutes. Suction isolation systems should be turned down or of, so as not to dry out the material. The heat of a curing light can help accelerate the set, and some brands of GICs (such as Fuji Triage Pink, GC America) can be command-set with the light. Do not allow the patient to bite down until the material is fully set. Fluoride varnish or petroleum jelly may be used to coat the GICS after it is set to help prevent excess moisture gain or loss (Figure 33).

Figures 33

Step Twelve – Instruct the patient to eat soft foods for 48 hours.

Documentation

An appropriate entry should be made in the patient's record indicating the date, surfaces sealed, and type of material used. Depending on the circumstances the operator may want or need to provide other pertinent information.

Follow-up

Pit and fissure sealants should be checked annually (Figure 34). If some or all of the RBSs has been lost, it should be repaired or replaced to continue preventing caries. Even if the GICs has worn, it will continue to prevent caries. Regular radiographs are helpful to follow the success of this procedure. Parents and patients must be educated about the importance of re-evaluating the sealants and an overall preventive dentistry regimen including proper homecare, fluoride exposure (either systemic and/or topical) and the avoidance of cariogenic foods and drinks. It is important to explain to patients and their guardians that sealants can help reduce the risk of decay on the sealed tooth, but they will not prevent all cavities, especially if diet and hygiene is poor.

Figure 34. Pit and fissures being checked..

Public Health Programs

Pit and fissure sealants can be placed in many settings; therefore, it is a portable procedure. This has led to many uses by public health dentistry. Most of the historical studies that were used to determine the efficacy of dental sealants were done in public health settings. Since this procedure can be done with minimal equipment and costs, those with access problems can be accommodated. There are governmental programs such as "Seal America" and SEALS which provide resources for community groups to start sealant programs.

A 2018 systematic review and meta-analysis concluded that "It seems that GIC-based sealants, with their lower technique sensitivity, good adherence, and fluoride-releasing properties, have an additive effect of being a sealant and fluoride provider for the prevention of occlusal caries. Therefore, GIC-based sealants may be a good alternative to RBSs specifically in community procedures when there is limited equipment, no chairside assistant for the dentist or dental hygienist, and a considerable number of children at high risk of developing caries."[6]

A 6-year prospective open cohort study in 33 US public elementary schools which utilized GICs demonstrated a 50% reduction in the prevalence of untreated caries. The study provided care to 6,927 children including dental hygienists that provided twice-yearly prophylaxis, glass ionomer sealants (e.g., HVGIC, Fuji IX, GC America), glass ionomer interim therapeutic restorations, fluoride varnish, toothbrushes, fluoride toothpaste, oral hygiene instruction, and referral to community dentists as needed.[19]

There has been more focus on population-based health at the state and national level. United States Public Health Service has established a national health objective for the year 2020 to increase the proportion of children and adolescents who have received dental sealants on their molar teeth. Oregon's Senate Bill 660 states "By using evidence-based data and best practices, the Oregon Health Authority shall promote oral health throughout this state by ensuring the availability of dental sealant programs to students attending school in Oregon." A report released by the Centers for Disease Control and Prevention in 2016, reported that overall sealant use prevalence has increased to 46% during the period of 2011-2014 as compared to 31% measured from 1999-2004 but disparities still exist among socioeconomic groups.[20] Pew Children's Dental Campaign released a report focusing on prevention, examining states' efforts to improve access to sealants for low-income kids. They reported that 39 states and the District of Columbia do not have sealant programs in a majority of high-need schools—those with a high proportion of children most at risk of decay. Unfortunately, two states have no programs in these schools. "Only 13 states have met the Healthy People 2010 goal of sealing the permanent molars of at least half of their 8-year-olds."[21]

Conclusion

Dental sealants are an evidence-based clinical practice and are recommended by federal agencies (Centers for Medicare and Medicaid Services; Centers for Disease Control and Prevention; U.S. Department of Health and Human Services) as well as by professional organizations (American Dental Association; American Academy for Pediatric Dentistry) as an effective preventive method to avoid decay in permanent teeth in children. Dental sealants are truly the added link in preventative dentistry. Ongoing research continues to find this procedure effective, safe, and of a low enough cost that all populations can access this service. With the use of fluorides, regular dental evaluations, patient education, plaque control, reduction of sugar exposure, and the use of dental sealants, future generations will have healthy, non-restored dentitions.

Course Test Preview

To receive Continuing Education credit for this course, you must complete the online test. Please go to: *www.dentalcare.com/en-us/ce-courses/ce673/test*

1. **According to the Cochrane Database of Systematic Review, what is the one-year reduction in caries following properly placed dental sealants?**
   A. 51%
   B. 86%
   C. 75%
   D. 39%

2. **How does the cost of placing a dental sealant compare to the cost of placing an occlusal amalgam restoration?**
   A. A sealant costs twice as much as a restoration.
   B. A sealant costs about the same as a restoration.
   C. A restoration costs about 50% less than a sealant.
   D. A restoration costs twice as much as a sealant.

3. **The need for placement of dental sealants has become more of a necessity because:**
   A. Occlusal surfaces are protected by fluorides.
   B. The American diet contains less fermentable carbohydrates than in the past.
   C. Disease trends indicate the majority of caries are occlusal.
   D. The placement of two surface amalgams that cover the occlusal surfaces.

4. **Which of following methods of protecting the occlusal surfaces of teeth removes the least amount of enamel?**
   A. Preventive resin restorations
   B. Prophylactic odontonomy
   C. Dental sealants
   D. Small amalgam restorations

5. **Which of the following is the most critical step in the placement of resin based pit and fissure sealants?**
   A. Material selection
   B. Light curing
   C. Isolation
   D. Cleaning the tooth surface

6. **All of the following are benefits of glass ionomer cement sealants EXCEPT for one. Which is the exception?**
   A. Hydrophilic
   B. Fluoride release
   C. Material loss is not associated with the risk of developing caries
   D. Light cure only

7. **When saliva touches the surface of an etched tooth, what takes place immediately?**
   A. Demineralization
   B. Remineralization
   C. Activation
   D. Nothing

8. When placing the sealant material it is important to:

A. Use the maximum amount of material to insure full occlusal coverage.
B. Use all of the material in the dispenser.
C. Use the minimum amount of the material to cover all the pits and fissures.
D. Use air to move the material around.

9. All of the following techniques are used to evaluate a sealant for proper placement EXCEPT one. Which is the exception?

A. Exploring for voids or bubbles.
B. Checking how securely the sealant is attached to the tooth surface.
C. Checking the occlusion for premature contacts.
D. Take a radiograph of the sealant.

10. Which of the following is the most appropriate method for removing excess material from a polymerized sealant?

A. Scraping with a sharp instrument.
B. Using a finishing bur with a hand piece.
C. Using prophy paste and a brush.
D. Dissolve Chemically

11. How do acid etching and prophylactic polishing compare with regard to loss of tooth structure?

A. Etching removes approximately 10 microns and polishing removes approximately 4 microns.
B. Etching removes approximately 4 microns and polishing removes approximately 10 microns.
C. Both procedures remove the same amount of enamel.
D. Neither procedure removes tooth structure.

12. Which tooth surface benefits the least from the caries reducing effects of fluoride?

A. Incisal surfaces
B. Smooth surfaces
C. Pits and fissures
D. Proximal surfaces

13. How do patients seeking dental treatment in private offices differ from those treated in community sealant programs?

A. They are episodic users of primary dental care services.
B. They seek treatment when in pain.
C. They are more likely to have continuous care.
D. They do not differ in how they use the dental care system.

14. Tooth enamel that is etched but not covered with sealant material will:

A. Decay
B. Demineralize
C. Discolor
D. Remineralize

15. Most of the historical studies that proved the efficacy of dental sealants were done in which of the following environments?

A. University settings
B. Private dental offices
C. Public health settings
D. Dental hygiene clinics

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Additional Resources

- No Additional Resources Available.

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