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Effect of of total etch versus self etch on dentin hypersensitivity

A Project Submitted to
The College of Dentistry, Mustansiriyah University, Department of operative in Partial Fulfillment for the Bachelor Degree in Dental Surgery.

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“Give acknowledgment to the supervisors Dr. Alaa Safaa Aldeen Abdul Mahdi who assisted the student in the preparation of his/her graduation project “

Dedication

I Dedicate This Work to My Dearest Parents, Brothers and friends.

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List of abbreviation

DH	Dentin hypersensitivity
TE	Total etch
SE	Self etch

Introduction

The usage of resin composite for restorations has grown as a result of the need for aesthetically pleasing restorations, growing concern over amalgam toxicity, and environmental issues related to mercury . (***Anusavice KJ (2003).***Without a strong link to the remaining tooth structure, decent composite filling will not survive.

Leakage along the restoration margins should be prevented with a good adhesive. Essentially, the primary bonding process of modern adhesives can be thought of as an exchange process wherein inorganic tooth material is replaced with resin monomers, which, after setting in situ, micro-mechanically interlock to form microporosities.

One unfavorable outcome of dental restorations using direct composite resin materials and adhesives is post-operative sensitivity.
Significant advancements that have improved dentistry have occurred since Buonocore (1955) created the acid-etching process, which makes a tooth surface more receptive for adhesion. This is because adhesion is needed to support improved retention and marginal integrity during the functioning of the repaired teeth as well as to resist and survive contraction pressures during the polymerization of composite resin ***(Davidson et al., 1994).***

A brief, sharp pain that arises from exposed dentine in reaction to stimuli, usually thermal, evaporative, tactile, osmotic, or chemical, and that cannot be attributed to any other dental defect or condition is known as dentine hypersensitivity (DH).***(Amin M, Naz F, Sheikh A, et al,2015)***.

Early clinical research revealed that up to 30% of study participants experienced post-operative sensitivity following the placement of posterior composite restorations. Various factors, such as dentine etching, polymerization shrinkage, over-drying of the dentin, restoration technique, and cavity depth, were typically blamed for this. Three processes have historically been used to bond to dentine: priming, conditioning, and bonding. The main method for achieving this kind of micro-mechanical retention is diffusion. More proof has recently been found to support the possibility of an additional bonding mechanism, namely the chemical interaction of certain monomers with calcium in hydroxyapatite. One popular type of dentin adhesive is called total etch (TE) dentine.

Longer etching periods, over-drying the dentin, and possible contamination during the acid etchant wash are the main disadvantages of etch and rinse systems (***Masarwa N, Mohamed A, et al,2016)***.

Self etch (SE) adhesives were developed in an effort to reduce the number of steps in dentin bonding, which increased the possibility of procedural errors. SE adhesives do away with the necessity for an additional acid etching/conditioning phase, as well as the dentin's following rinsing and drying ***(Cardoso. MV, de Almeida Neves A, et al ,2011);(Burke FJ,2004).***

The amount of steps involved in applying composite restorations has decreased with the introduction of new adhesive solutions. With fewer steps (no etch and rinse), less chance of over-drying, lower method sensitivity, and consequently lower reported post-operative sensitivity, self-etch adhesives seemed to be beneficial to clinicians ***(Casselli D.S, 2006.;Cardoso MV, de Almeida Neves, 2011).***

with bond strengths TE materials use 30 to 40 percent phosphoric acid to etch dentin and enamel before the clinician applies the adhesive to the prepara- tion. approach those of enamel bonding.Recent dentin adhesives use one of two strategies to interact with the dentin smear layer.The primary goal of dentin bonding systems is to provide retention of restorative materials to the dental structure as well as to seal the dentin substrate. even though the immediate bonding effectiveness of most current adhesive systems is favorable ***(De Munck J, Van Landuyt K ,et al, 2005).***

One type of dental adhesive that is frequently utilized is total etch adhesive. Modern adhesives have reduced the amount of steps required to install composite restorations. Adhesives that self-etch have been shown to be advantageous for operators who don't need to etch and rinse. The majority of medical professionals believe that self-etching results in less post-operative sensitivity than total etching ***(Sabbagh J, Fahd JC, et al., 2018).***

The aim of study

The aim of this study was to determine post-operative sensitivity following composite restoration using total etch as compared to self-etch

Chapter one 1. Literature review

1. Adhesion

Significant advancements in dentistry have occurred since Buonocore (1955) created the acid-etching procedure, which produces a tooth surface that is more responsive to adhesion. This is because adhesion is necessary for improved retention and marginal integrity during the functioning of the repaired teeth as well as to resist and endure contraction forces during the polymerization of composite resin ***(Davidson et al., 1994).***

After the resin has polymerized, appropriate monomers wet and interpenetrate the collagen, expand the network of fibrils, and produce a resin-impregnated hybrid layer, which provides a mechanical coupling zone between the two substrates ***(Nakabayashi et al., 1982; Pashley et al., 1993).***

Because the hybrid layer uses collagen fibrils to facilitate the inter-diffusion of hydrophilic monomers into the demineralized area, it improves the bond strength of the composite resin restoration, safeguards the restorative interface from microleakage, and reduces post-operative sensitivity in the tooth.

The self-etch, or SE, technique or the TE technique are the two ways that modern dentin adhesives interact with the dentin smear layer.

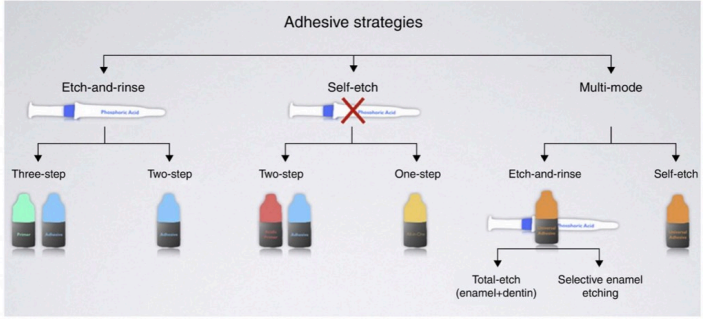

Figure (1) adhesive strategies

1.1. Enamel etching

preparing the tooth's enamel for the adhesive application by roughening it up. Acid etching is the process of using an acidic substance to microscopically roughen the enamel's surface in order to improve the retention of resin sealant.

Text

The dentin's surface is demineralized and the smear layer is removed using phosphoric acid. This makes the surface of the collagen fiber network visible ***(Yoshida Y, Nagakane K, 2004)***

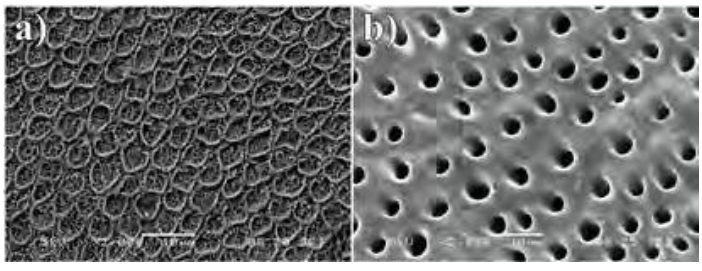

Figure (1.1) a) Prismatic structure of enamel after phosphoric acid etching (cross-section); b) The surface of dentin with dentinal tubules after phosphoric acid etching (cross-section).

1.2. Dentin Etching

roughening up the tooth's enamel in preparation for the adhesive application. The technique known as "acid etching" involves microscopically roughening the enamel's surface using an acidic material to enhance the retention of resin sealant.
Phosphoric acid is used to demineralize the dentin's surface and eliminate the smear layer.
This allows the collagen fiber network's surface to be seen ***(Yoshida Y, Nagakane K, 2004).***

2. Total etch

TE materials use 30 to 40 percent phosphoric acid to etch dentin and enamel before the clinician applies the adhesive to the prepara- tion. Etching dentin removes the smear layer and opens up the dentinal tubules.***(Eick JD, 1997,Miller MB. 2002)***. The total-etching systems require a conditioning, a rinsing and a priming step in order to allow involvement of collagen fibers by the resin monomers and the formation of the so-called 'hybrid layer' ***(Carvalho et al.).***

To allow for sufficient monomer penetration into the conditioned dentin, intertubular dentin demineralization and interfibrillar porosity maintenance are necessary. Complete etching facilitates the surface demineralization of dentin, facilitates its cleaning, and distributes collagen fibers to the teeth, adhesive system, and restorative material interface. Relatively high phosphoric acid concentrations (32–37%) must be administered to dentin in a separate stage for total-etching systems. Collagen fibers that are insoluble in acid are left floating in water after etching, which eliminates the acid and dissolves the mineral. High hydrophilicity and sensitivity to dehydration and shrinkage characterize this collagen network (Pashley et al.).
In order to complete the bonding process, these fibrils must be embedded with hydrophilic monomers. One method involves priming, an intermediary step, with an aqueous solution of hydrophlic monomers such HEMA ***(Nakabayashi & Pashley, 1998)***. The HEMA-water-collagen combination will gradually dehydrate but will stay completely expanded to enable the eventual incorporation of the adhesive resin monomers when it is gently dried with air
(Pashley et al.).

The total-etching adhesive methods are used in three steps. "One-bottle" adhesives are another type of total-etching since they penetrate the dentin tubules and collagen fibrils with a blend of organic solvents and resins (HEMA, BISGMA, TEGMA, and UDMA). Acetone and alcohol are the most often employed organic solvents in this approach because they have a better driving force for water removal than HEMA-water primers and swiftly displace water in the collagen network.Therefore, these solutions accomplish a dynamic dehydration, because the rigidification of collagen fibers and the incorporation of the bonding resin occur simultaneously. However, recent research indicates that one-bottle adhesives increase the shrinkage of wet-decalcified dentin, thereby reducing infiltration of resin monomers. The advantage of these systems is the elimination of priming as a
separate step, simplification of the procedure, and saving clinical time ***(Tay & Pashley, et al,2001)***.

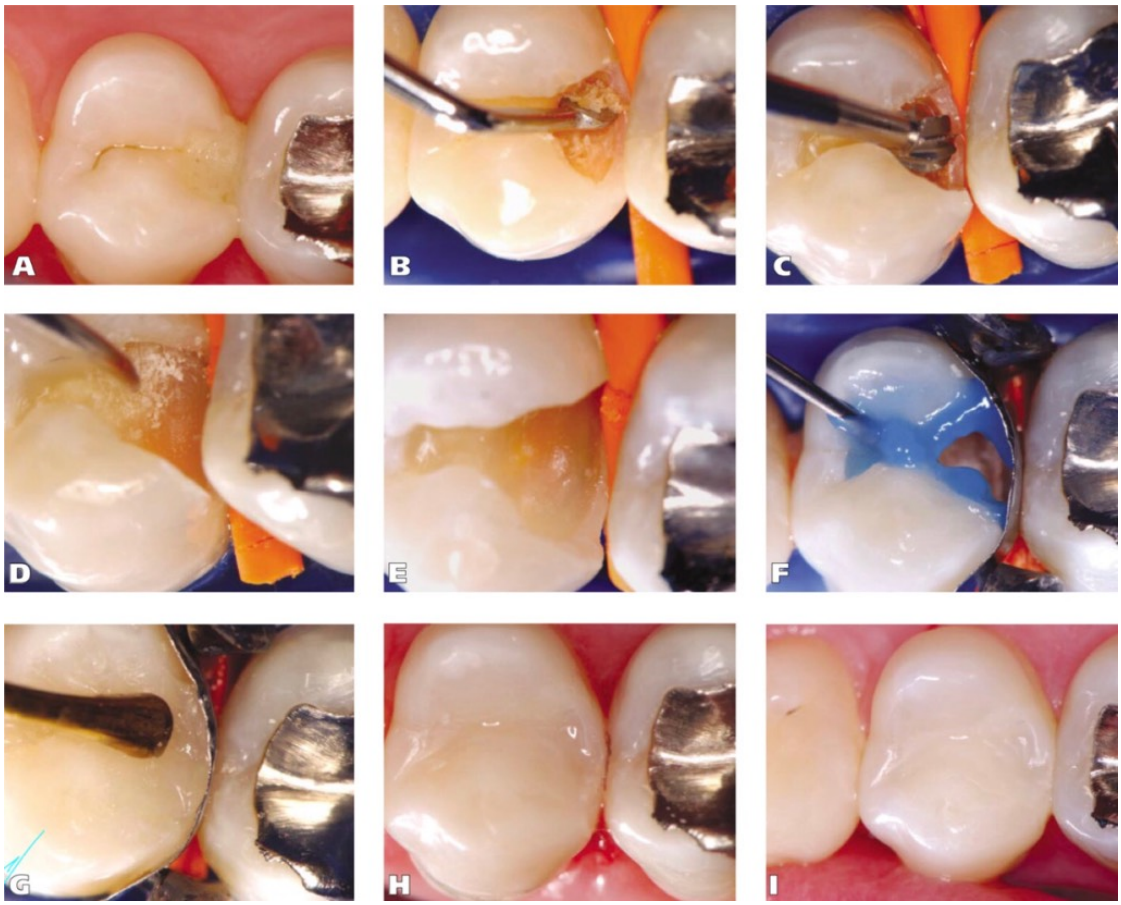

Figure (1.2) total etch technique

3. Self-etch

SE adhesives are becoming more and more popular; they don't require a further acid-etch procedure and don't eliminate the smear layer.Simultaneous demineralization and resin monomer infiltration characterize self-etching adhesive systems. The approach is appealing due to its decreased sensitivity in maintaining the smear layer and smear plugs, which reduces the likelihood of unintentional contamination of the bonding surface with the dentinal surface via dentinal fluid transudate.Self-etch systems use an acidic resin that primes and etches without requiring etching or rinsing; bond will then be applied thereafter.

In our clinical investigation, we investigated two hypotheses: that a SE adhesive would cause greater enamel marginal discolouration than a TE adhesive, and that a SE adhesive would result in reduced post-operative sensitivity.adhesives from SE. SE adhesives rely on their capacity to partially dissolve hydroxyapatite to produce a resin-infiltrated zone with integrated minerals. They treat and prime dentin and enamel simultaneously without rinsing.***(Perdigão J, Lopes M. 1999).***

But not every SE material interacts with the smear layer in the same way. As a result, they are divided into three groups: mild, moderate, and aggressive. Clearfil SE Bond is categorized as a light SE adhesive ***(Pashley DH, et al,2001).***Several investigations have shown that enamel bonding following traditional phosphoric acid etching is just as successful when done with SE adhesives., Subsequent research has shown that SE adhesives work best on ground enamel and less well on intact enamel ***(Kanemura N, Sano H, et al, 2000).***

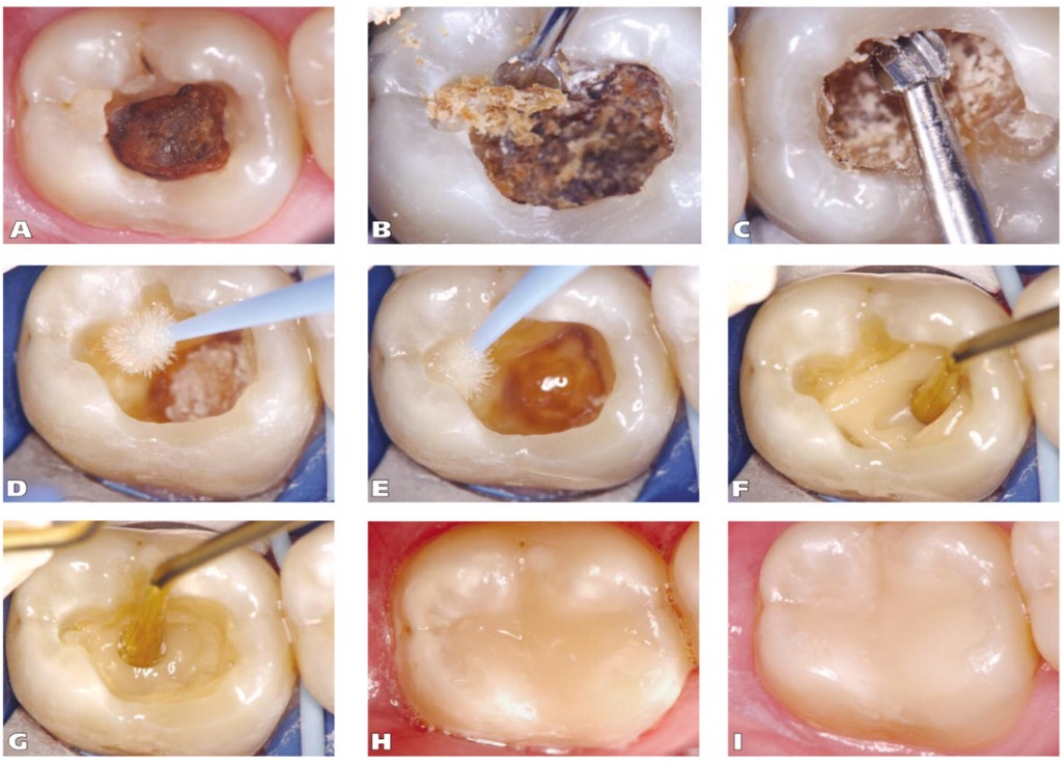

Figure (1.3) self etch technique

3.1. The benefit of self etch

self-etch is that it reduces some of the phosphoric acid etching dentin's procedure sensitivity. The drawback is that some self-etch adhesives, while superior to total-etch methods for adhering to dentin, lack the acidity necessary to produce surface texture on enamel.

Self-etching primer adhesive solutions aim to achieve the following:

1. make the bonding process simpler;
2. lessen the method sensitivity of the adhesive protocol by removing the necessity for the dental substrate to be acid-conditioned, rinsed, and dried.

This intriguing method of adhesion employs primers with acidic monomers that:

1. prime and etch dentin concurrently;
2. allow mineral crystals surrounding collagen fibers to dissolve and resin to penetrate into the dentin matrix beneath the smear-covered surface.

4. Differences in TE and SE Techniques

Clinicians must learn the ins and outs of both the total-etch and self-etch processes in order to become proficient in adhesive dentistry.

Enamel acid-etching has been done since the 1950s and involves demineralizing certain areas of hydroxyapatite crystals to provide a porous surface that can be bonded by micro-mechanical means. Today's dentin is etched using acid using either the self-etch (SE) or total-etch (TE) method. The operator will choose one of these methods based on personal preferences in addition to a number of clinical considerations.

The TE procedure opens the underlying dentin tubules by decalcifying the exterior layer of dentin, removing the smear layer, which is around 10 μm thick. This reveals the fragile collagen fibers, which are then filled in with a resin adhesive after being primed (for example, with a hydrophilic resin monomer). In many methods, adhesive and primer are applied simultaneously. The doctor must completely seal dentin tubules during this operation in order to prevent bacterial invasion and/or sensitivity. Larger direct restorations and indirect restorations are typically handled by the author using the TE approach.

The SE technique entails applying an acidic primer to the smear layer and the underlying dentin in order to facilitate the adhesive's micro-mechanical bonding, as opposed to removing the smear layer. By stopping the collagen fibers from collapsing following conditioning and drying in the TE process, this approach reduces the risk of postoperative sensitivity. Although the SE approach has less clinical history, the author has used it with great success for less invasive operations such shallow Class I or Class II restorations.

	Self etch technique	Total etch technique
Advantages	Simple procedures + Reduced post-operative sensitivity + High bond durability to dentin + Less technique sensitivity (wet bonding is not required) + Esthetic (thin bonding layer)	High bond strength to uncut enamel + Excellent marginal integrity
Disadvantages	Low bond strength to uncut enamel - Poor marginal integrity(marginal defect and discoloration)	Complicated procedures - Higher risk of post-operative Sensitivity- Low bond durability to dentin

Table (1) Advantages and disadvantages of self-etching and total-etching systems

5. Dentinal hypersensitivity

Shape of Dentinal Tubules.

It has been demonstrated under a microscope that dentinal regions that are hypersensitive have more and broader tubules than nonsensitive locations. This shows that a hydrodynamic process mediates stimulus transmission over dentin in teeth that are hypersensitive. ***(Absi EG, Addy M, J Clin Periodontol 1987)***

Assuming that dentinal tubules are open at the exposed dentin surface and patent across the pulp, this theory will account for the transmission of stimuli across dentin. This would provide some insight into why some individuals with cervical dentin exposed have dentinal hypersensitivity while others do not. The distribution of the open tubules is uneven and they are not visible over the entire dentin surface. Only the parts with open tubules would react painfully when prodded, as can be shown.(***Absi EG, Addy M, Adams 1987)***

One of the most prevalent clinical issues is dentine sensitivity (DS), which is characterized by brief, sharp pain that develops quickly and disappears as soon as the stimulus is removed. DS is caused by exposed dentine reacting to stimuli, usually thermal, evaporative, tactile, osmotic, or chemical, and

it can be divided into three types:

(Joseph ,2018)

1. Physiological: When exposed to cold or hot stimuli, a healthy tooth has normal or physiological sensitivity. (***J Can Dent Assoc. 2003)***

2.Pathological conditions including cavities, fractures, erosion, or gingival recession can exacerbate a person's reaction to mechanical, chemical, or thermal stimuli.

3.Iatrogenic sensitivity brought on by treatments performed by a dentist or other dental healthcare professional. Examples include periodontal treatments and intra- and extra-coronal restorations that include the removal and replacement of tooth structure.

5.1. Evaluation of sensitivity for generations

.First generation :Sensitivity following surgery was typical in cases of posterior occlusal restorations.

Second generation :The weak dentin bond in these systems ranged from 4.0 to 6.0 Mpa. This did not considerably lessen the posterior occlusal restoration's post-operative sensitivity.

.Third generation :Two-component primer/adhesive systems were introduced to the dentistry industry by third generation bonding agents.The dentin bond strengths (up to l0 Mpa) were considerably enhanced by these materials. Most post-operative sensitivity cases involving posterior restorations showed a discernible decline as well.

.Forth generation :The dentin matrix contained a zone of collagen and bonding resin due to hybridization, which was the defining feature of the fourth generation of bonding systems. The procedure employed both dentinal and intertubular dentin to produce bond strength, which resulted in a significant improvement in bond strength values (up to 18 MPa).extremely poor sensitivity and r4-provided.***(Duarte RM, 2006)***

fifth generation: one component, one bottle bonding system.In this system, the entire priming and bonding sequence involves a single liquid, in a singlebottle. Dentin bond strengths for these adhesives are well above the15 Mpa level, although some studies have reported bond strengths of more than 20 MPa. Postoperative sensitivityis very rare.

5.2. Prevelance of Post operative sensitivity in resin composite restoration

It's critical to understand that a resin composite restoration is not the same as merely excising diseased tissue and gradually adding restorative material. Rather, it consists of a number of meticulously needed stages that must be followed in order for the restoration to be effective; that is, for the patient to have a completely sealed restoration that restores the tooth's shape and function.(***Akpata ES, 2001***)

The clinical state of the tooth to be treated (the health of the pulp and remaining hard dental tissue), the restorative material, and the restorative technique interact to produce post-operative sensitivity, which can be brought on by a variety of factors and is not always the result of a single factor acting alone.As a result, sensitivity is a constant and unpredictable possibility. (***Dietschi D, Spreafico R 1997)***

Furthermore, there exist additional variables associated with the genesis of post-operative sensitivity, including the unique characteristics of each patient, the configuration and scope of cavity preparation, and the safeguarding of the dentin-pulp complex. ***(Sarrett DC ,2005)***

Sensitivity can be defined as the body's way of telling you that something is amiss. It can also arise spontaneously or in reaction to an aggressive stimulus. Even when the stimulus is placed far from the pulp tissue, as in the outer layers of dentin, the pulp's sensory potential allows it to react with an instantaneous painful response. ***(Dietschi D, Spreafico R 1997 ,2005;Akpata ES, 2001***)

Clinicians have been dealing with postoperative pain following the placement of posterior composite restorations for nearly 20 years, even in cases when a dentin liner is utilized 17–20. Postoperative sensitivity with resin-based composite restorations in Classes I, II, and V continues to be an issue for other dentists.

According to clinical research, the prevalence of sensitivity following resin composite restorations ranges widely from 0 to 50% (16–20), with posterior teeth and

Class II restorations being the most commonly affected. Professionals may occasionally be forced to replace restorations due to the patient's significant discomfort when the issue cannot be resolved. According to patient descriptions, it is a mild to severe pain that flares up when chewing, sometimes with hot or cold food and other times with acidic or sweet foods. It goes away when the stimulus is removed.

(Sab TBB (2008);Buonocore MG (1955)Perdigão J; Lopes M (1999)

5.3. Post operative sensitivity related to adhesive system

According to the manufacturers, compared to total-etch systems, self-etch adhesives—also referred to as 6th, 7th, and 8th generation—cause a decreased incidence of post-operative sensitivity. Several investigations have been presented, with results that seem inconsistent being reported. Using self-etch or total-etch adhesive methods did not appear to affect post-operative sensitivity or marginal discolouration, according to certain studies. Others came to the conclusion that self-etching bonding methods, as opposed to total-etch adhesive systems, were more successful in lowering post-operative sensitivity in deep cavities. A second study compared the clinical efficacy of the self-etch technique with the etch and rinse procedure for direct resin composite restorations in adult patients' permanent teeth using randomized clinical trials.

The main outcome measure was the degree of post-operative sensitivity and its risk. They concluded that the risk and severity of post-operative sensitivity were unaffected by the kind of adhesive or the method utilized for posterior resin composite restorations.
The incidence of post-operative sensitivity to total-etch versus self-etch adhesive systems was evaluated by Swift et al. They found that 23% of patients experienced post-operative sensitivity after using either total-etch (Optibond Solo Plus, Kerr, Orange, USA) or self-etch (Xenon III, Dentsply, Konstanz, Germany) adhesive during the first week following the placement of Class I posterior composite restorations. However, sensitivity significantly declined over time, and there was no statistically significant difference between the two groups. Therefore, the bonding mechanism might not have an impact on the incidence of post-operative sensitivity.

Dentin adhesive-induced postoperative sensitivity has not received much attention in clinical investigations. In a study, Opdam and associates restored teeth using a resin-based composite and a multibottle, water-based TE dentin glue. They discovered that fourteen percent of the teeth had spontaneous postoperative sensitivity at five to six weeks, and that up to 56 percent of posterior dental restorations caused sensitivity on loading. Although sensitivity for a SE adhesive was found to be nearly negligible in another study, TE glue was not used by the researchers as a positive control.

Two different hypotheses were tested: Compared to a TE adhesive, a SE adhesive would cause less postoperative sensitivity.
Post-operative sensitivity can be reduced through the application of supplies that will secure the dentino- pulp structure, for instance calcium hydroxide, glass ionomer and resin-based adhesive systems. These materials should have bacteriostatic and bactericidal properties that shield the pulp against the thermal, electrical or noxious stimuli and have bio compatible with the pulp and restorative material used but in some instances Post-operative sensitivity is also evident even when the dentin liner is used.***(Cortés O, Alcaina A, et al,2017).***

5.4. Post-operative sensitivity related to composite materials

When inserting a composite into a cavity, there are numerous potential causes of post-operative sensitivity. These include:

1. Cusp deflection will arise from contraction brought on by shrinkage during polymerization.
   (Eunice C, Margarida A,et al, 2012);(Sonwane SR, Hambire UV,et al ,2015).

2. Incomplete coating of the dentine surface with adhesives following acid etching.

3. Bulk filling placement using non-bulk fill composite materials;

4. Poor adaptation of composite material to internal walls and floors, especially on the cervical floor in an interproximal restoration;

5. Occlusal discrepancies. As for all restorations, the occlusion of the new restoration should be checked before discharging the patient. Any discrepancy in lateral or protrusive function may initiate tooth sensitivity.

5.5. Post operative sensitivity related to placement technique

1. Cavity preparation that damages dental tissues

2. The type of adhesive system you use, self-etch vs. total-etch

3. Not utilizing a desensitizer on the dentine surface

4. Incomplete polymerization of the material because of curing

5. The use of improper technique when placing materials into the cavity

6. Causes and solutions of post operative hypersensitivity

The causes and solution are ***(Terri Lively,2021)***

1.Over etching :Excessive engraving Sensitivity might result from over-etching. A demineralization zone is created when bonding material is left on the tooth for an extended period of time and is unable to physically reach the depth to which the dentist etched the tooth.
Resolution: "We now have a different perspective on how we etch,

Figure (1.4) over etching

2.The solvent was not eliminated:Not eliminating the solvents during the drying process is another frequent issue. Solvents might induce sensitivity if they remain after healing.

3.Insufficient healing Undercurring is one of the main causes of post-operative sensitivity, according to Dr. Bizga. Under-curing can occur for a number of reasons, such as not knowing how long to use the curing light on the materials, how far away you should hold it from the material, or not curing deep enough into the preparation. Before following your cementation treatment, you can use some amazing desensitizers that will significantly lessen it, according to Dr. Bizga. Clinical observation has revealed that patients experience varying degrees and scenarios of dentinal discomfort following resin composite restorations, particularly in posterior teeth. Even in cases when there are no obvious restoration difficulties, this is a prevalent issue. Even though pain has no direct connection to pathological processes, it is one of the most frequent reasons people seek dental care, whether in a public or private setting. Pain is always a warning indication of potential aggressiveness.

16

Figure (1.5) undercuring

4. Excessive drying During the etch and rinse process, if the tooth is overly dry, the bonding agent will not function properly.
Solution: Read the material directions carefully to prevent over-drying the dentin.Many of the instructions you'll find online require or suggest using a moist-bonding approach. Everyone who does bonding should be constantly aware of these four most frequent errors in technique that might result in post-operative sensitivity in bonded restorations. There is one more, though, that is less well-known yet could also be sensitive.

5. Insufficient isolation When bonding, Dr. Bizga says, everything must be as close to ideal conditions as you can manage. Your working field needs to be free of saliva, blood, and crevicular fluids, if possible.
Solution: Dr. Bizga recommends using a rubber dam or an isolation device, like a Zyris product (Isolite®, Isodry®, or Isovac®) .
Many other areas contribute to post-operative sensitivity, which includes pathology. Secondary caries, cracks from bruxism or other forces, and gum recession can cause sensitivity after restorative work. Also, if you aren't using a composite or glass ionomer for restorative work, there can be sensitivity with metal restorations, like gold. In those cases, Dr. Bizga likes to use desensitizing agents underneath the restoration.
Before following your cementation treatment, you can use some amazing desensitizers that will significantly lessen it, according to Dr. Bizga. Clinical observation has revealed that patients experience varying degrees and scenarios of dentinal discomfort following resin composite restorations, particularly in posterior teeth. Even in cases when there are no obvious restoration difficulties, this is a prevalent issue. Even though pain has no direct connection to pathological processes, it is one of the most frequent reasons people seek dental care, whether in a public or private setting. Pain is always a warning indication of potential aggressiveness.
(Porto I, "Post-operative sensitivity ,et al ,2012).

Figure (1.6) insufficient isolation

6.Etching deep dentine in class ones with phosphoric acid

As in total-etch procedures, phosphoric acid etchant is applied to etch the dentine and needs to be rinsed and dried. In deep dentine, overdrying the collagen layer and thus collapsing the fibres in the intertubular dentine prevents the adhesive from penetrating correctly. As mentioned before, this collapse of the collagen fibres is a major cause of post-operative sensitivity. In self-etch, the etching depth and the depth of the adhesive's penetration into the dentine is the same, meaning the collagen fibres are prevented from collapsing.

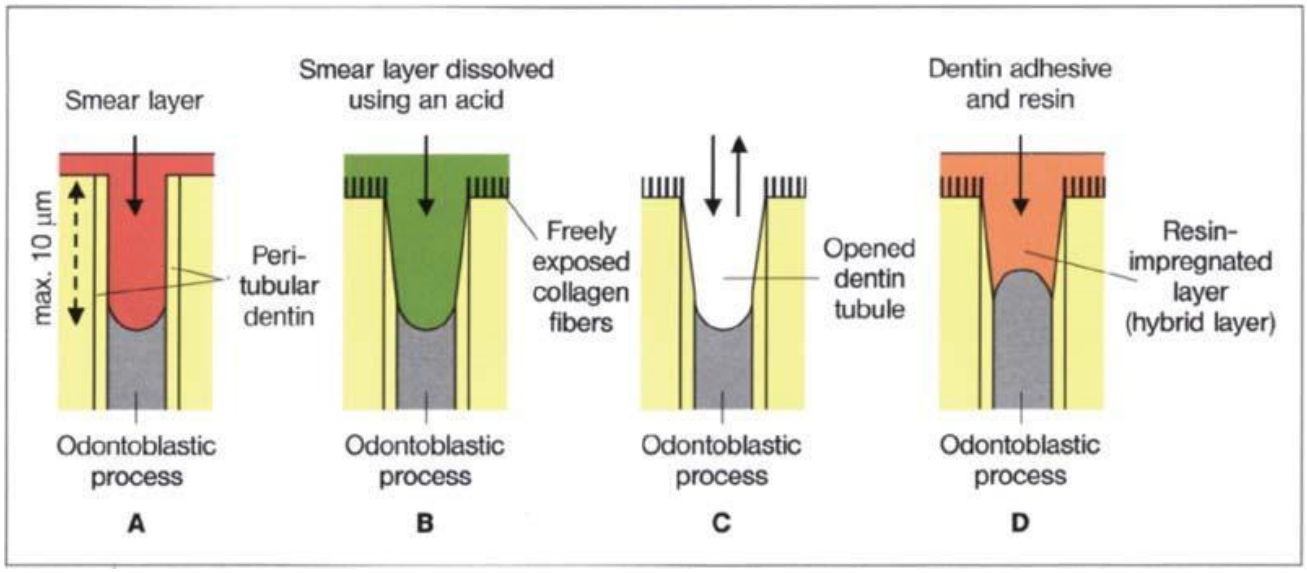

Figure (1.7) Etching deep dentine in class ones with phosphoric acid

Chapter two: 2.1. DISCUSSION

Bacterial penetration of the pulp and dentin etching are two of the reasons that have been linked to postoperative discomfort.Occlusal differences, shrinkage stress-induced cusp deformation, and composite deformation caused by occlusal forces in combination.Many dentists indicate that postoperative sensitivity is still common, which has brought the issue back to light.Few clinical investigations have examined the postoperative sensitivity of SE, TE, or both adhesives in posterior restorations, with inconsistent findings.Although these were multistep materials that are no longer widely used by doctors, one study compared a TE adhesive with a SE adhesive.
(Christensen G. 2009;Opdam NJ, Feilzer AJ, 1998;Brännstrom M,et al,1992 ;Bryant RW, Mahler D, et al,1986)

SE adhesives. Without rinsing, SE adhesives condition and prime dentin and enamel concurrently. Their efficacy stems from their capacity to partially dissolve hydroxyapatite, resulting in a zone where minerals have been absorbed into the resin.The way that different SE materials interact with the smear layer varies, though. As a result, three classifications have been established for them: mild, moderate, and aggressive. Clearfil SE Bond falls under the mild category.The fact that SE adhesives do not etch enamel as deeply as phosphoric acid does is one of their shortcomings.
(***Miller MB, et al,2002;Pashley DH, Tay FR,et al,2001; Perdigão J, Lopes M ,1999)***

SE adhesives' capacity to etch enamel has been assessed in a number of research.Several investigations have shown that enamel bonding following traditional phosphoric acid etching is just as successful when done with SE adhesives.SE adhesives are less effective on intact enamel, as evidenced by other studies, and only work on ground enamel.since phosphoric acid etching produces a more distinct enamel-etching pattern than SE materials do.
However, when we looked at restorations bonded with the SE adhesive at six months, we did not find any clinical indications of marginal degradation.

56% of the posterior teeth restored with TE showed sensitivity upon loading, according to Opdam, and 14% of the teeth showed spontaneous postoperative sensitivity at five to seven weeks. In the group receiving all etch treatments, there was a lower percentage of postoperative sensitivity. While other studies revealed no change in postoperative sensitivity in class-I and II composite restorations, Burrow discovered no significant difference in postoperative sensitivity. The differing adhesive brands employed in various experiments may be the cause of the wide range of outcomes observed in those investigations.
(***Pashley DH, Tay FR,et al,2001;Perdigão J ,et al, Geraldeli S, et al,2003;Perdigão J, Lopes L, et al,1997;Miyazaki M, Sato M, 2000)***

Chapter three: 3.1. Conclusion and suggestion

It is technically harder to realize a successful composite restoration than an amalgam restoration. When a posterior resin system is placed, post-operative sensitivity could become a clinical issue. Technique mistakes made prior to, during, and following the placement of the repair might lead to a number of causes of sensitivity. Post-operative dentinal sensitivity can also be brought on by the dynamics of a badly executed restoration. When restorations are strictly implanted in line with the technical instructions, post-operative sensitivity can be avoided or maintained at low levels.

Self-etch adhesives were created in response to the shortcomings of total etch adhesives, which are still the industry standard for bond strength. Clinical success is directly correlated with bond strength. There was no significant difference in post-operative sensitivity between self-etch and total etch adhesives, according to certain studies, although self-etch adhesives had a reduced incidence of sensitivity. In this area, more clinical trials are necessary.

Reference

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