Resin Infiltration Technique: Pediatric Applications

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Resin Infiltration Technique: Pediatric Applications

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ABOUT THE AUTHOR

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INTRODUCTION

As dental practitioners, we have many restorative alternatives available that are changing and improving at a rapid pace. For those of us who care for children, the properties and requirements of these options are of utmost importance, given the different stages of development, both dentally and behaviorally, that present to us on a daily basis. The guidelines on pediatric restorative dentistry that are put forth by the American Academy of Pediatric Dentistry are published in order to assist practitioners in the restorative care of their patients. Many alternative restorative treatments, based upon the most current literature, are discussed in these guidelines. At the outset of the guideline, it is stressed that restorative treatment and comprehensive treatment plans must take the following factors into consideration: developmental age, caries risk assessment, oral hygiene, and patient and parent compliance.1 With knowledge of these factors, as well as knowledge of current materials available to us as clinical practitioners, we can then make decisions on the best available materials and techniques for our individual patients.

Differences in Patients and Dental Materials

Not all patients are equal, and most certainly not all restorative materials and techniques are equal. We have a very wide range available to us, from hydrophilic to hydrophobic materials, from forgiving materials to more technique sensitive ones, and from temporary to longer-lasting restorative choices. Our clinical decisions must be based upon both an intimate knowledge of our pediatric patients’ requirements and behavior and, in addition, taking into account their parents’ requirements and behavior. Furthermore, our knowledge must be as intimate as to the requirements and behaviors of those materials and techniques available to us. Finally, in order to take advantage of all that dentistry has to offer our patients, we must remain both open-minded to new and emerging technologies, and equally demanding that these are supported by sound scientific data.

Conservative Treatment of Incipient Lesions: Resin Infiltration

As clinicians, we are often presented with patients who have incipient lesions. These incipiencies can be diagnosed interproximally radiographically, or with many of our newer technology caries scanning devices.2 Excellent radiographic techniques and emerging technologies allow us the opportunity to diagnose and treat incipiencies in a more conservative manner. We are able to identify lesions at
earlier stages of destruction, and thus, we must be well educated in methods to treat these lesions in the most effective way possible.

A resin infiltration system (Icon [DMG America]) was recently introduced for the treatment of incipient lesions, either in the proximal or smooth surface location, using an infusion of a highly fluid unfilled light-cured resin. It is a restorative method that can be used equally well, with great success, in both primary and permanent teeth. Successful treatment of either proximal or smooth surface lesions results in the repair of the existing lesion and in halting further progression by stabilizing the surrounding tooth structure. Recent studies have shown efficacy in prevention of further demineralization. In addition, randomized clinical trials in proximal lesions of permanent teeth have demonstrated significant halting of the progression of lesions after a 3-year period. Further studies concluded that treatment with resin infiltration in conjunction with fluoride varnish is promising for controlling proximal lesions. In fact, teeth treated with resin infiltration showed higher Vickers hardness values than untreated teeth. Due to the efficacy of the method of resin infiltration, tooth structure is saved, local anesthesia is avoided, and the patient experience is better with long-term costs for restoration of the lesion also significantly decreased. The method of resin infiltration has been well researched, documented, and is clinically proven. A resin infiltration system (Icon [DMG America]) was recently introduced for the treatment of incipient lesions, either in the proximal or smooth surface location, using an infusion of a highly fluid unfilled light-cured resin. It is a restorative method that can be used equally well, with great success, in both primary and permanent teeth. Successful treatment of either proximal or smooth surface lesions results in the repair of the existing lesion and in halting further progression by stabilizing the surrounding tooth structure. Recent studies have shown efficacy in prevention of further demineralization. In addition, randomized clinical trials in proximal lesions of permanent teeth have demonstrated significant halting of the progression of lesions after a 3-year period. Further studies concluded that treatment with resin infiltration in conjunction with fluoride varnish is promising for controlling proximal lesions. In fact, teeth treated with resin infiltration showed higher Vickers hardness values than untreated teeth. Due to the efficacy of the method of resin infiltration, tooth structure is saved, local anesthesia is avoided, and the patient experience is better with long-term costs for restoration of the lesion also significantly decreased. The method of resin infiltration has been well researched, documented, and is clinically proven.

**Synopsis of the Procedural Steps**
The procedure is simple to follow and all materials and equipment are included in the Icon kit. The steps include: isolation of the tooth, application of an etchant (Icon Etch), application of the drying agent (Icon Dry), 2 applications of the infiltrant resin (Icon Infiltrant), and light curing at each infiltrant step. Key to success of the technique is strict adherence to manufacturer's instructions. The amount of scientific literature behind each step of the technique is vast. For example, composition, timing, and frequency of repetition of the Icon Infiltrant step is cited in several studies, and the most effective practice is examined in detail. The same in-depth research has been executed for the Icon Etch, Icon Dry, and the light-curing steps.

**Factors for Success**
There are a few points to follow in order to have a successful treatment. First and foremost, when treating proximal lesions, there must be sufficient space interproximally to passively fit the applicators. This is easily achieved by placing an orthodontic separator for a time period preoperatively. The duration of separator placement will depend upon the tightness of the interproximal contact; in some cases, 15 minutes is sufficient, and in other situations, a few days of separation are needed. Remember that the etchant, drying agent, and infiltrant must all be able to flow interproximally unimpeded.

Also important to success of the resin infiltration technique is the proper isolation of the area to be treated, since the materials are hydrophobic. Contamination with saliva or blood will result in failure of penetration of the materials into the lesion, and ultimately failure of the procedure. Excellent isolation with a rubber dam is optimal. Since the procedure takes approximately 12 to 14 minutes to complete, a precooperative or uncooperative child is not a candidate for this resin infiltration technique.

One of the challenges with this procedure is that the material is radiolucent and, as such, cannot be detected on traditional radiographic examination. This does not mean that the lesion cannot be evaluated radiographically; rather that the way the clinician monitors the lesion will be different than the current paradigm. Specifically, in terms of radiographic assessment, one would monitor whether the lesion is progressing radiographically at subsequent recalls. Current advancements in diagnostic technologies would eliminate this difficulty. These include, but are not limited to, digital subtraction radiography, fluorescence, electronic frequency, and ultrasound. However, a challenge still remains for those patients who leave our offices and have traditional radiographic examinations completed at a new and uninformed office, thus having the infiltrated lesions mistaken for caries. Cards that indicate record of treatment are provided by the company and can be given to the patient, but the risk of mistaken diagnosis still remains for those who fail to keep the cards and pass this information on to their new dental office.

**Continuing Education**

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CASE REPORTS

Case 1: Resin Infiltration of an Incipient Carious Lesion

A 5-year-old male patient presented with interproximal lesions. Since he was compliant and cooperative, it was determined that he would be a suitable candidate for resin infiltration. In addition, his parents were of a high dental IQ and they understood the importance of regular follow-up.

Clinical Protocol: Separation—An orthodontic separator was placed 15 minutes prior to treatment to create some separation of the teeth prior to placement of the separating wedge (Figure 1). After isolation, the orthodontic separator was removed and the green wedge placed interproximally (Figure 2). The wedge should be placed at a straight angle, so as not to cause any harm to the gingival tissues. It is placed gently until the first resistance is felt. Leave the wedge in place for several seconds before slowly advancing further, thereby achieving the maximum separation possible. Your patient will feel this pressure at first; following a few seconds, pressure anesthesia will overcome the initially uncomfortable sensation.

Etchant—Attach the applicator tip to the syringe of the Icon Etch, which is a 15% hydrochloric acid gel. The green side of the foil is the active side, with perforations to allow for dispensing the Icon Etch. The syringe is placed interproximally (Figure 3) and the etchant is dispensed by twisting the plunger in a screw-like fashion. The Icon Etch is left in place for 2 full minutes (Figure 4), allowing for some agitation of the acid while it is in contact with the proximal surface. Next, wash for 30 full seconds and air dry with oil-free air.

Drying—Icon Dry, a 99% ethanol solution, is applied (Figure 5) and left in place for a full 30 seconds. The area is then dried with oil-free air.

Infiltration—At this point, remove direct overhead light source to avoid any premature curing of the infiltrant. Attach an applicator tip to the Icon Infiltrant and apply infiltrant by
twisting the syringe (Figure 6). Leave the infiltrant undisturbed for 3 minutes. Maintain a moist surface by continuing to add infiltrant periodically during this time period, ensuring that an adequate supply of resin to the lesion. Remove any excess material and light cure for 40 seconds. Repeat the infiltration process with a new applicator tip. Leave undisturbed for one minute, remove excess again, and then light cure an additional 40 seconds.

Finish—The finishing step is accomplished by removing any excess infiltrant material with floss and hand instruments.

Case 2: Treating White Spot Lesions
One extraordinary feature of this infiltrant material is that it has the same refractive index as enamel. This is a great benefit because once applied, it will mask out most smooth surface white spot lesions, making them effectively disappear (or at least with much improved aesthetics, in some cases). Although this is an irrelevant point for interproximal lesions, it is very relevant for smooth surface lesions. It effectively wipes out the white spot lesion when placed on smooth surfaces. This allows us to treat post-orthodontic white spot lesions—and, in fact, any white spot lesions that are a result of demineralization—both conservatively and effectively.18

A 3-year-old female patient presented with anterior smooth surface white spot lesions (Figure 7). She was very compliant and cooperative. Resin infiltration was carried out in the exact same manner as in the case described previously. An excellent result was obtained for an otherwise very rapidly spreading smooth surface white spot lesion (Figure 8). Note: The procedures for resin infiltration can be coded as D2990. This new ADA coding was adopted in 2013.

IN SUMMARY
The resin infiltration technique is simple to understand and to master, and is very beneficial to the patient as well as rewarding for the doctor. As demonstrated on the 2 mini cases presented herein, it is a very minimally invasive technique that gives the clinician a “no anesthesia, no drilling” option for the patient.

REFERENCES
micro-invasivo para lesões proximais não cavitadas em crianças [Acceptability of micro-invasive treatment for non-cavitated proximal lesions in children], FC 76, ID 6518, FDI, Salvador de Bahia, Brazil; September 6 to 10, 2010.


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POST EXAMINATION QUESTIONS

1. The guidelines on pediatric restorative dentistry that are put forth by the American Academy of Pediatric Dentistry are published in order to assist practitioners in the restorative care of their patients.
   a. True      b. False

2. Successful treatment of either proximal or smooth surface lesions results in the repair of the existing lesion and in halting further progression by stabilizing the surrounding tooth structure; however, recent studies have not shown efficacy in prevention of further demineralization.
   a. True      b. False

3. Further studies concluded that treatment with resin infiltration in conjunction with fluoride varnish is promising for controlling proximal lesions.
   a. True      b. False

4. The Icon (DMG America) material is radiopaque and, as such, can be easily detected on traditional radiographic examination.
   a. True      b. False

5. The infiltrant material (Icon) has the same refractive index as enamel and, once applied, it will mask out most smooth surface white spot lesions.
   a. True      b. False
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