

# Anterior Resin Infiltration: A Minimally Invasive Treatment Option for Enamel Caries and Cosmetic Defects

## Video Transcript

Jeanette MacLean:

Hi. Hello again, for those of you that are joining us again for the second time this week, or maybe you saw me a couple of weeks ago when I did the first one. Thanks so much to everyone at CE Zoom for putting this together. You guys are awesome. Thanks to Crest Oral-B for sponsoring this. Really appreciate what you guys are doing to support all of us during this interesting time that we're in. Today we're going to talk about resin infiltration, but unlike the first series that I did, where I talked about incipient proximal lesions for the posterior teeth, this time we're going to talk about in the aesthetic zone or what they call smooth surface resin infiltration. Okay, here we go.

And just as a disclaimer, I don't have any financial interest in the products that we'll talk about today. I'm a private practice, pediatric dentist practice owner. I'll share with you what I do in my own practice and tips and tricks like that, but it's not like I own any products or have interest shares in anything. I do get speaking honorariums from various companies that you see listed there to give lectures, but they don't actually have input in the content. Another shout out to Organized Dentistry. Think it's so important to get involved and support this in any way that you can, whether it's through your membership or if you can get involved in committees now more than ever. And of course, sharing our time and talents with those that are less fortunate and perhaps lack access to care. And I have become known as an advocate of minimally invasive dentistry. There's my little girl, Sabrina, when she lost her front tooth.

Oh boy. Let me tell you, homeschooling the kiddos is a good time, which leads us to this image. Raise your hand if you feel like this right now. Oh my goodness. I don't know what it is about this week, but myself and so many friends, like I feel like we finally hit the wall where it's like, oh, I just want my normal life, normal stress back, but this just cracks me up. This is the edited version, but yes, this is me trying to work from home, watch my kids, stay hydrated, not be broke, stay quarantined, find toilet paper, wash my hands and stop touching my dang face. And that's kind of how I think how I look at it.

I'm rocking some, I don't know, I guess you can't see my grays, but there are natural highlights. All right. And I love to always give this disclaimer, I'm a clinician. I consider myself a forever student. Science is ever evolving. That's why we take CE. Yeah, let's learn about enamel. Enamel reflects light from the surface and subsurface, and then if there's a disruption in the enamel, so that this is an issue for me is sometimes the kids, let's say they're teasing and bullying from their peers. I absolutely have had kids that come in and express to me that so-and-so at school said, "Ooh, what's that brown spot on your tooth?" And it's sad.

Now, let's look at a differential diagnosis specific to congenitally enamel defects. Of course there's a variety of scenarios. You could see spots that were due to trauma, infection, there's molar incisor hypomineralization or MIH for short, fluorosis. And just some other possible contributing factors would be fever,

premature birth, illness during gestation, systemic illness, or of course genetic issues such as amelogenesis imperfecta. But often the etiology is unknown, so it's kind of anyone's best guess. Here's an example of a defect created from trauma. This is a patient of mine with known repeat trauma to her primary incisors. And hopefully you can appreciate there's this white spot towards the incisal edge of her upper left, permanent central incisor or what we say number nine in the US. This is a known trauma.

And then the thought process here is when the injury occurs, if there's bleeding into the sulcus that could lead to a yellowing defect infection to the primary tooth can also lead to enamel defects. The thought process there is that a disturbance in the pH of the developing tooth follicle could lead to a discoloration. I've absolutely seen that where I have a patient and let's say their permanent dentition comes in, everything looks fine except for one rogue. Let's say a bicuspid premolar, and it's all modeled. Everything else looks great. And then sure enough, you look back in the history and oh, the primary tooth was abscessed and extracted. Oh, gee. Coincidence? No, not a coincidence.

Molar incisor hypomineralization, this is getting a little more attention now, which is great because this is a really challenging condition to treat and very complicated. It's confusing as to what exactly is going on. And it would be nice if there was more research or time and attention paid to this topic. Prevalence is about 20% to 40% of patients. I definitely feel like I see it to some varying level, at least weekly, if not daily. But it's characterized by these demarcated enamel opacities. They could be white, cream, yellow, or brown surrounded by perfectly normal enamel. Typically, you'll see it in a first primary molar. Typically, I'll see this on first permanent molars and it could be like one, two, sometimes it's all four, but sometimes you'll see it even the primary second molars or in a few of the permanent incisors. They have this trademark hypersensitivity and a 10-fold, higher risk of developing caries. And it's an unknown etiology of systemic origin.

And then of course, there's fluorosis. This is a patient of mine. We have areas in Arizona

where there's naturally occurring, high levels of fluoride in the water, like they're on well water. I have a handful of patients from this area called Maricopa, like the town [up County I 00:07:08]. I live in the county, but we have Phoenix's city water, which they can regulate exactly how much fluoride is in there. But it's just so sad to see these kiddos and he of course, was severely affected. Fluorosis is due to ingestion of excessive fluoride during tooth development. And this is more of what we see like a mild presentation of fluorosis. I'd like to call this frosted tips. This is typically like someone who was using excessive amounts of fluoridated toothpaste. We try to teach the parents, "Hey, smear on the little ones and then three and up, you could do a piece size amount." The sad thing is a lot of times these kids are not well supervised or the parents aren't well-informed, and they're putting the big ribbon of toothpaste like you see in the commercials, which is way too much, even for an adult.

And then the kids are swallowing it and it tastes good. So, "Ooh, let's put some more." And then they're drinking fluoridated water. It is just an accumulation of those things, you can see these mild presentations of fluorosis. ADA has a nice resource on prevention of fluorosis. You can refer to that, if you like, or maybe add it to your office website. Now, white spot lesions are of course early stage caries lesions. So, that's all the imbalance in the enamel where a net remineralization is not keeping up with net demineralization. That leads of course, to a carious lesion and eventually it could lead to a cavitation. This is my favorite stat from my review, that the prevalence months post-orthodontic white spot lesions or of ortho patients could be anywhere from 2% to 97%. How do you like that spread?

But I'm sure you've all seen a fair amount of patients that have had braces in the past. And maybe they only have one or one or two spots, but some folks have just throughout the mouth, I call it ring around the bracket, which is really sad. Contemporary concepts and carious tissue removal is to simply be less invasive. Remove less tooth structure if even remove any at all that's going to help prolong the lifespan of a natural dentition. We talked about that a lot in

the proximal ICON lecture. This is especially true in the anterior. Now, as far as minimally invasive treatment options, of course you could do bleaching, but I'm sure you've seen this and I've seen this. In some cases, especially with the congenital enamel defects, sometimes bleaching or home whitening systems is what I'm referring to, can make the spots even more noticeable so that's problematic.

There's enamel microabrasion, which is an acid and an abrasive. That can be pretty effective, like in a milder fluorosis case, if it's a real superficial lesion. But it does remove a pretty significant amount of enamel and doesn't actually impregnate the tooth with anything to reinforce it, so to speak. You could do remineralization. You can do resin infiltration. There's an etch bleach seal. You can do a combination of things. There's of course the surgical interventions like fillings, bondings, veneers, but those are really invasive and they can be very expensive. And if you're talking about someone very young and you don't want to do veneers on a 14-year-old, that just got their braces off. Heck no. We're going to focus today on the use of resin infiltration to treat not only white spot lesions, but also congenital enamel defects.

Now, one of the challenges is you'll find a mixture of opinions and information in the literature. The evidence for resin infiltration is really the best in comparison to some of the other techniques. And then just real quick. My normal full lecture, when I talk of all sorts of different strategies, I weigh pros and cons, but specific to resin infiltration or ICON resin infiltration, which just happens to be the only commercial available product on the market from DMG America. Pros, it's one appointment. There's no compliance needed. It's not like whitening teeth where they have to go home and wear it every day or anything like that. Or it's not like a prescript toothpaste that they have to comply and use every day because sometimes people are not compliant.

It does have superior aesthetics to some of the other noninvasive techniques and I'll explain why as we go through the slides. The results are stable after whitening. That's a very

common question that I get asked. It is less invasive than microabrasion. It's also capable of arresting incipient carious lesions. That's huge. Some cons, the cost of the materials, but I'll teach you some ways to save money. It doesn't work in every situation, so it's important to recognize that. For me it arrests incipient carious lesion. I'm really not bothered by this last con, but we have to acknowledge it. Some of my friends who get real nerdy about this, like, "Oh, it blocks natural remineralization." Like, "Ah." If you have someone who has poor saliva or maybe poor compliance, wouldn't you rather arrest the lesion versus waiting for it to get worse, and then you have to do the more invasive treatment?

So to me, it's not that big of a con. Now, consider treating these specific to enamel defects, you want to consider the age, the behavior of the patient. If you're dealing with kids, can they even tolerate it? The stage of eruption, maybe you see their incisors coming in, but they're only halfway in and you can't even see the full border of the lesion. That's not a good time to start with anything. Perhaps they're going into braces later. For example, sometimes I'll see kids with two little spots right in the middle of their two front teeth, and it's very obvious they need some ortho and if it's not bothering the patient, usually it bothers the parent more than the patient, which is really interesting, I should say.

But I'll point out, "Hey the brackets are going to be right there. There's soon to be brackets and wires in the way. We could always do this after." Usually they're okay with putting it off, but I certainly have done it young. I can't really say exactly the youngest, but at least as young as eight, nine years old, but the tooth has to be erupted enough that you see the full border of the lesion. You want to of course acknowledge social factors. If it's affecting their social and emotional wellbeing, then that would certainly be a reason to do it sooner rather than later, but within realistic parameters. Now, as far as treating post-ortho white spot lesions, the biggest message here that I want to drive home is, let's say someone gets de-banded from ortho, give them a chance to have the lesions naturally remineralize on their own first

because sometimes just taking the brackets off and it's easier to clean the teeth, some of those lesions just reverse on their own. Okay?

Give them that chance. Active carious lesions will be a dull white look. They're more porous and they can absorb calcium and phosphate from the saliva or let's say they're on a product like a remineralizing paste. Like for example, [MI Paste 00:15:26] is one of the ones that we carry. You might see some natural regression of the spots. Now, if they're shiny, that's an arrested lesion. It's not going to remineralize. Let's say they have white spots and you put them on 5000 ppm toothpaste, it can help arrest those lesions, but it's not going to reverse them aesthetically, if that makes sense. It hypomineralizes the outer surface, which is great because then it blocks mineral loss and it helps lessen the attack from acids, but it doesn't allow ingress of calcium and phosphate, so it's not going to reverse it.

So, my normal rule of thumb is to give them at least three months before going to do another procedure, like for example, the resin infiltration. Another issue too, is sometimes right when they get de-banded, the soft tissue is inflamed. I'm sure you've seen that with improved hygiene over time that the gingivitis can heal and shrink back. In some cases, the kids have such hypertrophic tissue that they even need gingivectomy. So, don't just rush right into doing these treatments, give them some time. We talked about this in the proximal lecture, but 5000 ppm is a great way to arrest lesions and also to prevent them in the first place. Now, if you're talking about existing white spot lesions, it can't reverse them.

It can help arrest them, but aesthetically, it's not going to reverse them. It's better to prevent them in the first place, is the point I'm trying to make, and that just reiterates it. All right, so now let's talk about the option of doing resin infiltration. ICON is the name of the system from DMG and that stands for infiltration concept. Get it, ICON? It's a minimally invasive treatment that uses microinvasive technology. They're using a highly fluid resin that absorbs into the tubules of the enamel and even into

the outer third of dentin. Instead of drilling away tooth structure, you're repairing it by getting the resin into the existing structure.

And this concept was first described over 40 years ago, but the product that we have commercially available to us was first released in 2009, so a little over a decade ago. The earlier focus of the research and literature was on the use of ICON for treating interproximal lesions, which is what we talked about last time in great detail. And of course the big benefit of that was conserving tooth structure because if you had to prep a class too, you're drilling through this marginal ridge, you take away a lot of tooth structure and of course a restoration, no matter how great you are, none of them lasts forever. Now, my mentor that taught me resin infiltration is Dr. Richard Chaet, who's now retired, but he's done so much resin infiltration.

And this was an article that he wrote specific to proximal lesion, so I won't spend too much time on that. But he particularly liked it and saw success for it in enamel lesions. Now, the big point of this is you cannot use resin infiltration. Now, if we're talking about anterior smooth surfaces, it's not appropriate for a cavitated lesion. It's not going to fill a chip or a hole in the tooth. That you would need to place a composite to fill the two. That is important to point out. And I mentioned there is better evidence for resin infiltration. It is in the ADA clinical practice guideline for nonsurgical treatments for caries management, specific to proximal lesions. Now, the more recent literature shifted focus to using ICON in the aesthetic zone.

Was kinda like, "Oh, hey. Look, it works for this too. Cool." This is to me like the premiere paper, if you're going to read any of the articles on resin infiltration this one is from the ADA Journal in 2013, and it's an excellent article and it's specific to resin infiltration for treating post-orthodontic white spot lesions in the aesthetic zone. Hey, they came at a better, more solid number of about 73% of ortho patients developing a white spot lesions. That sounds a little more accurate. That's better than 2% to 97%. And one of the points that

I like from this article is that they mentioned how microabrasion can potentially remove large amounts of enamel. And then they also make the point that typically we're seeing these white spot lesions in young patients that have just gotten their braces off.

Long-term prognosis of the restorative teeth is a significant concern, of course. This is a great option. And just real quickly on microabrasion, that was popular more so before we had resin infiltration. It's still used like I said, sometimes for, fluorosis. But just, you have to keep in mind, you're using a really strong acid and an abrasive. So, it does remove a pretty significant amount of enamel. And it's not actually doing anything to seal or impregnate the enamel with anything to reflect light differently. We had this particular system initially and kind of so-so results. I was happy when we had the advent of resin infiltration, which came after that. Here's one of the earlier papers where they started to realize, "Hey, we can use resin infiltration to treat fluorosis for example." That was exciting.

This is another great article from a Canadian dental magazine and this talks to the point of bleaching or whitening. And like I said, that's a common question that I get. They do recommend whitening. Let's say that your patient wants whiter teeth. Ideally have them whiten before you do the ICON resin infiltration procedure, so they get to the shade that they want. The infiltrate itself has no shade. It just takes on the shade of the surrounding enamel and creates an optical illusion that it's all one uniform intact surface and uniform color. And because of that, you can actually bleach or whiten your teeth after you've had resin infiltration, and the results will still be stable because it's the existing naturally enamel that's being bleached, not the infiltrant itself. I have seen this anecdotally with patients of mine that went on to whiten later where they might have a little temporary relapse of the spots that probably due to dehydration of the enamel, but then it just self-corrects.

And the ADA article that I've mentioned, they also stress the point of waiting three months after bracket removal to do this procedure, to allow natural regression. Now, as far as timing

pre-ortho, let's say you have someone who they're being teased, they're self-conscious, whatever, maybe they can't have braces yet or whatever the reason, it's not going to adversely impact bond strength to that tooth. It's not a concern at all. And there's a couple of papers to support that here. Yeah. It doesn't affect the bond strength. And now another key concept for resin infiltration is penetration coefficient. The infiltrant itself has to have that high fluidity to be able to adequately and efficiently absorb into the tubules of the tooth because if it can't, it's not going to get deep into the tooth surface. This paper found that resin mixtures with a high TEGDMA or triethylene glycol dimethacrylate tended to show better inhibition of lesion progression than those with BISGMA, like our conventional residents tend to have or bisphenol A.

Let's see. If you were trying to do a typical adhesive or typical resin you're looking at only 31 centimeter per second, and that is the metric that is used in the article. I know that sounds bizarre because we usually talk in terms of millimeter versus the resin infiltrant has a penetration coefficient of 273, that's significantly higher. This is the scientific rationale behind the superiority of ICON resin infiltration over say other alternatives like etch bleach seal or what I call poor man's ICON because the sealant just cannot penetrate as efficiently into the tooth surface. Another factor is the etch. If you're just using conventional phosphoric etch like a 37%, it's not going to get through that superficial hypomineralized layer that is going to block, ingress to the tubules. With the ICON system, you're using a 15% hydrochloric acid.

Yes, that's equivalent to a microabrasion, but you're not grinding it into the surface with acid. And this is a really nice schematic. This is from DMG, but just showing how efficient that hydrochloric acid was in removing that outer smeary, if you want to call it just to open the pores or the tubules of the enamel to then allow the resin to absorb and contrast to a conventional 37% phosphoric acid etch where it's like those tubules are still blocked. It's not going to really pick up anything. And maybe it's going to sit on the surface, but it's not going to soak into the tooth. And then here's another

schematic from the manufacturer. But just showing, you can have these porosities in the enamel surface where it hasn't actually broken down and [cavitated] yet, but it's porous. So, it has that chalky look because it's reflecting light differently.

And if you infiltrate that with resin, hey, it'll arrest the lesion, it'll block the acid attack and then reflect light to look like natural enamel. Here's in cross-section on actual enamel, but you can see this lesion body. And then you can see it with an infiltrant absorbed into the tubules. Here's another image of that, pretty cool. You can see the infiltrant in there. It can penetrate up to 1,000 microns into the lesion body and it creates what we call a diffusion barrier. And that's the process that actually arrests the carious lesion. Now, another key concept is this issue of refractive index. That is the degree that light bends when it travels from one medium to another and the refractive index of enamel, which is 1.62, it's so different from, say air or water. If there's porosities in enamel that's defective or damaged, it will reflect light differently.

That's why you can see it. Now, if you infiltrate that with a medium, this infiltrant that has a similar refractive index to natural enamel, that's where you get the optical illusion of healthy intact enamel. This is another reason why. There's some other techniques where you're not adding an infiltrant. But now if they're a mouth breather, the air reflects light differently, so you're still going to see the spot. Infiltrating it helps. All right. Let's get into it more clinically. This is how the product comes. There's two kits that you could get. You could get either the smooth surface or the interproximal. Today we're talking specific to the smooth surface application of this. That is the type of kit you would want. And you can get it either as a mini kit or cube. If you're new to this and you don't know how often you're going to be using it or the demand that would be a good starting point to get a mini kit. If you're like me and you do it more frequently, it makes sense to get the cube. It's like the Casco pack because of course that's going to be more economical.

And I should mention, I may not have remembered to add that slide, but they actually

sell the etching all by itself now. I think that's only been for about a year, so that's really cool too because that's typically what you run out of first. Now, they have where you can just refill the etch, which is nice. And now in terms of case selection, it needs to be a non-cavitated lesion. It can't be a whole yet. So, E1, E2 and even into the outer third of dentin. Now, of course in a smooth surface, you can not only see this, but you can feel this with your explorer. This is very different from when we were talking proximal lesions and you kind of sometimes don't know whether because you can't see between the teeth, right? Unless you put a separator and felt it.

This is much easier to analyze in the anterior. The part where it gets difficult is you don't know the depth of the lesion body because you're looking at it from the front. It's not like you can cut it in a cross section like those cool slides and show how deep it goes. We don't know. And that's why sometimes it doesn't work on every lesion because if it goes the full depth of the tooth you might not be able to get rid of the whole defect. These are the components of the smooth surface hit. You of course have the 15% hydrochloric acid gel or the ICON etch. You have a drying agent, which is the ethanol. And then you have the infiltrant, which is unfilled resin with a high penetration coefficient and then applicator tips. And here's your setup. I like to have a timer. You're going to need ... And we'll go through these step-by-step.

If you want to even take a photo of this, you can. Now, informed consent of course you want to obtain before doing the procedure. And the big message here is, we don't know for sure if every lesion will completely reverse with resin infiltration. You have to express that to the patient or let's say the parent. And the way I present it is, "These are the options; you can do nothing, you could do a filling or a veneer, et cetera." And review the pros and cons. And then I often offer resin infiltration, and I give them product information and handouts, which I'll show you later. And I explain, "This is a noninvasive way to manage. The benefit is I'm not drilling away your kids enamel." Worst case scenario, let's say it doesn't reverse, I'm arresting caries, so it can't get worse. It'll actually have this preventive factor, especially, let's say it's MIH, which is 10 times as likely to get caries.

Wouldn't it be nice to essentially seal that lesion to hopefully prevent caries? Truth be told, but the majority of the time we get significant improvement. I can't always get 100% and you don't know until you do it, but it's usually significant if not 100% improvement, but you have to be able to warn them. If they're not happy with the results, I say, "Then you could always move forward to do say a filling or a veneer." But at least you haven't done anything irreversible or invasive to the tooth. It's also a fraction of the cost in comparison to a vineyard. In some cases there are patients where they just do not want a veneer, period. They would rather have this than someone drooling away. The thought of drilling away an enamel, a circumferential width to their tooth, it kind of freaks them out. I do find a lot of interest in having a less invasive option.

Now, isolation is really important because it's resin and you don't want any contaminants. There's a variety of ways that you can isolate and we'll go through them. Now, if we're doing lesions that are kind of down near the incisal edges, I love these OptraGates. Those make it really easy because they just keep the lips out of the way. Now, our office is orthodontic and pediatrics, so we happen to have these. I like when the ortho assistants put them in because they're like psh-psh-psh. They're so fast. Whereas I'm like, "Ah, they're a little tricky." I suppose the more you do them, the easier it gets. It's nice because it's retracting and suctioning at the same time. And these are really good if you're having multiple arches of lesions being treated. Let's say you only have one or two spots or something close to the gum line, a liquid dam is good. This is the one that we use, the Kool-Dam. I will warn you however, I have run into snafus where you go to rinse and the stupid thing peels off. And you're like, "Ah." So, just be warned.

You can get fancy and you can do a combination. Here's a Kool-Dam with ... No, the Dry Field. We had multiple arches of lesions right by the gum line. Hopefully you can see that on the central and then on the canine, see those white spots. We don't want the hydrochloric acid to get on the gums because I'll show you what happens if that occurs, but

this is a nice way to do both arches at once because it's a time consuming procedure. The more chair time you can save by doing them simultaneously, it's great. You could use something like a DryShield. Now, proximal, we talked about this. You really need a rubber dam for posterior proximal, but in many cases in the anterior ... Oh, and just to point this out too, make sure you're using a compatible rubber dam. If you're using latex-free rubber dams that contain thermoplastic elastomers, it'll actually melt. So, yikes.

Make sure that you're using one that's compatible. If it's a regular rubber dam, you're fine. It's the latex-free ones, it has to be specific versions. And here's a list, if you want to take a screen grab of that. Or you can also reach out to DMG and they'll give you the list. But just use caution with that if you have a patient with a latex sensitivity. Make sure you're using the right rubber dam. It's great for post-ortho white spot lesions, the ones that are way up by the gum line. Here's an example where we did all of that, but still got gum and irritation. I mean, the gums were pretty bad to begin with.

This is a really tough case. I have low expectations for this case, but it ended up turning out really well. But still even with all that, see how the tissue is blanched and irritated from the hydrochloric acid. Now, this will heal. And I like to warn that this could happen and explain that it will heal itself, but it's good to warn them in advance, so they're not like, "Ah." Don't try this the day before your wedding. You got to leave a little buffer. I had one patient where he wanted to do this before prom, but prom was a week later. So, it was fine. Bear that in mind. I guess I don't have one. I have a picture later that'll show what it looks like later when that heals. All right.

Let's go through the basic protocol. Hopefully you can appreciate there's this white congenital enamel defect toward the incisal edge of their permanent central incisor here. This is a super easy starter case. It doesn't really look like a deep lesion. I like to get the surface clean using a plain pumice, and then you're going to isolate as needed. This is one little spot near the incisal edge that you don't have to

get carried away with a rubber dam here. And then you want to etch it for two minutes. The etch becomes inactive after two minutes. You don't have to freak out like, "OMG, I left it on there too long." It becomes inactive, but you do have to babysit it so speak where it starts to form these bubbles, it percolate. You want to keep moving it around so it keeps in constant contact with the tooth surface. And you want to go at least two millimeter beyond the border of the lesion because sometimes you'll find spots light like, "Oh, oops. I didn't notice that initially."

I like to get a good surface area. Now, remember you're using hydrochloric acid etch. You need to also be careful. If you overetch one little tiny spot, you can actually create a chemical cavitation, like a dent in the tooth. So, be careful. I've had people send me pictures of stuff where they totally screwed this up because they just overetched out the gate. Really respect the power of hydrochloric acid, you need and want to leave enamel. Don't melt away all the enamel, right? So, use caution. And this is just from the manufacturer about the amount of surface area. Again, apply it for two minutes moving around. I like to use the syringe tip to do this just a regular conventional etch syringe tip because I find that this allows me to conserve etch because like I said earlier, the etch is what you're going to run out of first. If you can get more out of the etch and not waste etch, you'll get more out of your kit where you could potentially use it for multiple cases versus having to keep buying more.

Now, it comes with these fuzzy tips, which are nice for applying it. But my personal preference is just to use the etch tip because see how a lot of the etch sticks to the applicator. That's just my personal pro-hack on being stingy with the etch and being able to let it make it last longer. You can move it around with a microbrush, but same point where it kind of sticks to the microbrush. After two minutes, you're going to rinse it thoroughly for 30 seconds and dry it with an oil-free air. Now for anterior teeth, you want to etch at least twice to sufficiently remove the thicker surface inhibited zone. Like remember where the tubules were blocked up or what they call a pseudo-intact-layer. Suction, rinse and dry again. Now, this is important

unless you're treating white spot lesions less than two months after bracket removal. I don't have to worry about that because I do not do this if they have just gotten their braces off again, you want those teeth to naturally regress or improve. Excuse me.

Because if you start putting a hydrochloric acid on a fresh, active white spot lesion, yikes. Be careful don't overetch, you might make a cavity. All right. Now, you're going to inspect the surface to see if it appears, chalky white, and then you're going to apply the ICON dry for 30 seconds. This is a little tricky. The ICON dry is actually liquid ethanol and you apply it. It's liquid initially and it helps dry up the tooth. But as you flood it with ethanol, look to see if it makes the defect disappear. That will be a sign that you've sufficiently accessed the lesion body and it's getting into the tubules of the tooth. All right. And if it doesn't, etch again. Now, if you have stubborn lesions, like let's say it's an older patient, let's say they have fluorosis or MIH something more extensive than what this girl had or like real thick enamel, you could abrade the surface with a polishing bur or even a fine Sof-Lex disk.

Some people do this right out the gate. Me, I don't. I only do it if I need to because I want to be as least invasive as possible. I try etching a few rounds first and only polishing the surface if I feel like we really need it. Again, why take away enamel if you don't need to? So, repeat a-two minute etch, suction the etch up and then rinse for 30 seconds and then apply the ICON dry for 30 seconds. Now, this is really important. I don't want you to overetch, be leery of people who are telling you like, "Oh yeah, etch eight, nine, 10 times." OMG, please don't do that especially if you're new to this. Trust me, I get those 911 DMs. Etching beyond three minutes is considered off label. You absolutely could etch more than three times, but don't just off the top etch excessively because you could have a problem.

You may do additional rounds of etch, use extreme caution. Monitor it closely, so you're not creating an enamel defect or a ledge because again, it's hydrochloric acid. So, it's taking away microscopic layers of enamels. You



don't want to overdo it. Be like Kenny Rogers, RIP, "You got to know when to hold them, know when to fold them and know when to walk away." Respect the etch. All right. When you're getting ready to infiltrate, you want to switch off your overhead light because you don't want it to set up the resin. If you have a headlamp, one, either cover it with the orange guard or switch it off. And then you're going to apply the ICON-infiltrant and flood the entire facial surface of the tooth and allow it to absorb for at least three minutes. I like to set a timer for this.

And you really want to flood the surface. You're not like being stingy and be like, "Oh, I'm just going to put a little light on the spot." No, cover the whole facial surface with the infiltrant and allow it to absorb. Occasionally twist the little syringe so more comes out because as it absorbs, you want to make sure that there's more available to absorb by capillary action into the body of the lesion. Now, after three minutes you want to remove the excess infiltrant. I like to use clean dry cotton rolls and I just wipe it off. And it literally makes a little squeaking sound kind of like when you're cleaning windows, it's very satisfying. Now, this is new information that I learned from a professor from Brazil at IADR. And this was like pew, like one of those light bulb moments. Like, "Why didn't I think of that?" Okay. I told you how you have to apply the infiltrant for three minutes. And I told you how it doesn't eliminate every lesion. Right?

Well, this genius doctor was like, "Well, why not infiltrate longer?" Oh, again though. Why didn't I think about that? So, if you have a lesion body that is deeper, give the infiltrant more time. Let's say you can't eliminate or you don't eliminate the lesion after three minutes of absorption, keep adding infiltrant and let it soak deeper into the lesion body. I thought that was brilliant. Let me show you an example. This is from her where she has this congenitally enamel defect. Here it is at the beginning of applying the infiltrant, here's three minutes later. I know it's hard to see because of the light reflecting, but you can definitely still see that lesion. Then she lets it go for six minutes, nine minutes, 12, 18, and then it is

final. She completely eliminated this. This is a great way where you could potentially treat deeper lesions without having to overetch them and remove excessive enamel and thin out the tooth. You don't want to do this, so that this is just great.

I feel like it has, I know ... I first started doing resin infiltration for this purpose in 2013. It's been almost seven years. And I think back like I had known this before, I bet there's lesions that I could have 100%, gotten out, when I only got maybe 80% improvement. So, here's an example of that. This is a really tough case where she has MIH and hopefully you can appreciate that a lot of the teeth have it, but her number eight or hers maxillary right permanent central incisor had the worst of it. And her dad was a little cheap and he's like, "Oh, we could do the one worst tooth first." "Okay, dad." Of course it's easier to do them all at the same time, but that's what he was willing to do. And I knew on her, it was going to be deeper and I didn't want to thin out her enamel so we did the minimum rounds of etch, but then I tried to just increase infiltration time. Just letting it soak longer.

I didn't just stop, wipe it off and light cure it, kind of freeze it in its tracks for three minutes. I let it keep soaking in and adding more. Here's six minutes, nine minutes. And it was funny because she wanted to see, so we gave her the mirror and I thought the look on her face was just priceless. This is a great new trick. Again, infiltrate for at least three minutes. If you have a more stubborn, deeper lesion, MIH something like that, you could increase the infiltration time beyond three minutes. Up to you. All right. So, remove the excess. I told you about the cotton rolls. I also like to use micro brushes and then you want to floss the contacts. Some people put little Mylar strips, to me it's just like a bunch of stuff in the way and you really don't need to have them. Just floss the contacts because it's not sitting up on top or gluing everything together.

You're only leaving behind what actually absorbed into the tooth, if that makes sense. And then this is important. You want to light cure it for 40 seconds. That's a longer amount

of time than we're often used to, but 40 seconds and that's per tooth. If you're doing multiple teeth, you need to do 40, 40, 40, like make sure you're adequately, properly light curing. And now you're going to repeat the infiltrant step. This time you're only going to apply it for one minute and one minute is adequate and initially this confused me. I'm like, "Well, it's already on there. Why do you need to add it again?" And the reason is this helps with the polymerization shrinkage. Oops. Okay. Again, remove excess, floss the contacts, light cure for 40 seconds. Now, they will have a little bit of a texture difference feeling on their tongue. You want to get it nice and smooth.

My preference is to use the fine soft-like disk to polish and then rinse their mouth thoroughly because it does have a poor taste. Really rinse out their mouth. And here it is all finished, before and after. Nice and simple. I've never had to retreat one of these, I've seen stable results. I've been doing this seven years, I've never had to redo one. I've seen stable results after whitening. It's a great option because sometimes let's say I drilled that out and put a composite resin filling, which can look great. Sometimes the color match is tough. If they whiten, it's not going to match. Let's say they drink a lot of soda or whatever, their hygiene maybe isn't the best, you can start to see the margin of the resin. This is a great option. Now, let's watch. Hopefully the video will play here. That's loud. Let me control the volume. You might have to lower your own volume.

(silence)

Sorry, like it wouldn't let me stop. Post Op instructions. We actually have this on our website, which is [kidsteethandbraces.com](http://kidsteethandbraces.com). There's a services tab. You can click on that. There's a dropdown menu and you'll see resin infiltration select that. And there's case examples on there, more information, there's some things you can download, like some handouts and this being one of them, the Post Op instructions. The main thing is refraining from having anything to eat or drink that has a lot of dye in it within the first 24 hours. If the soft tissue is irritated, how to care for that. Now, I will tell you one horror story. And

I think it's on my tips list, but it's really critical to cure the full 40 seconds. This was imprinted on my brain. The rep came the very first time back in 2003, when I did this and she shared a cautionary tale where she had a dentist who did this procedure, looked amazing, the patient was thrilled, went home and had a hot dog with yellow mustard and their teeth stained bright yellow.

So, it turns out what happened is he forgot to light cure the second round of infiltrate that one minute. Don't forget to cure, don't undercure. I saw a question pop out about breaking up the fort. No, I just do straight 40 seconds and I have not had an issue with overheating. And I should also mention this. You don't need local anesthetic for this procedure. It doesn't create any sensitivity. If they're wiggly or squirmy or apprehensive, we'll recommend nitrous, but that's really optional. Just some tips to sum it up here. Case selection remembering it's not going to work on every lesion. If you see a case where it's obviously through and through, like severe congenital enamel defect, this is not going to happen.

Maybe I might get a little improvement. I'll show you that really bad fluorosis case. Now, if they're on a prescription strength, like a 5000 ppm toothpaste, they need to discontinue it at least two weeks prior to doing the procedure because remember that toothpaste makes your teeth more acid resistant. Same thing like if you do a varnish or a professional fluoride treatment, wait two weeks. You don't want to do varnish one day and then try to do resin infiltration the next day because your etching isn't going to be as effective. I already mentioned how, if they want whiter teeth, ideally have them do at home or in office whitening system before attempting this procedure, so they get to the color of enamel that they want because if they have a chalky white spot that you're correcting, the teeth don't magically all become chalky white.

They have to understand, it's going to look like the rest of the tooth. If the rest of the tooth has more of a yellow undertone ... That's my reminder that we've got 15 minutes. It's going to match the natural color of the tooth. If

they want it whiter, try to whiten first, but they could technically bleach later. However, those peroxide-based whitening systems, this is key, you have to make sure that you wait at least two weeks before doing the ICON procedure because the peroxide could still be present and the tubules of the tooth and it'll interfere with the procedure. That's really, really important to communicate to the patient because sometimes people will post like, "Oh, I got no results." There's typically something that's happening that is sabotaging them. Those are some of the key ones.

Remember to agitate the etch around when you're waiting those two minutes. You could abrade the surface if needed, if you have a real stubborn spot. Remember not to overetch. Someone's telling you like, "Oh, just etch it 10 times." Please don't do that. Trust me. I've definitely done somewhere I had to etch more times, maybe even up to six, but again, you're what you're watching it so carefully and so closely and making sure you're not creating a defect or a ledge. Be very, very cautious. Remember to switch the light off. I saw another question pop up, it was like, "Well, will the ambient light?" I have not found that to be an issue. It's not like I turn all the lights in the room off, but that really intense overhead chair light and/or if you have lights on your loop, those need to be turned off.

We talked about going beyond three minutes. If you have a potentially deeper lesion body, again, thoroughly cure, remember the mustard nightmare. Now, if you don't adequately remove the infiltrant, remember you don't want it sitting up on top. You only want what's absorbed into the lesion body. You want to completely wipe away, remove the excess. Otherwise to me, I've seen people read, it's obviously left it all, sitting on top and it kind of looked yellow. Make sure you're polishing so it has a nice smooth texture and what's interesting, often these look even better the next day probably because the teeth rehydrate. I've had patients express that, I've had other providers who do this quite regularly who have shared that. They sometimes look better in time.

Now, the code for resin infiltration, there is a CDT code. It's 2990 resin infiltration of incipient,

smooth surface lesions. You want to document it per tooth and note the specific surfaces. My fee is similar to a one surface resin fee. I've heard anywhere from like one to four surfaces. It really just kind of depends on your practice and the location and et cetera, et cetera. Or how quick you are to do it because it does take some chair time. It's understandable that you need to charge an appropriate fee. Most insurances don't cover it, but typically they're more than happy to pay out of pocket if this is the type of noninvasive treatment that they're wanting and a nice comparison as I tell them like, "Well, this is what this cost." And they'll compare that like to your typical veneer, it's a fraction of the cost.

Now, as far as scheduling, it's only one appointment I mentioned about nitrous, if they're apprehensive or wiggly, but you don't need local anesthetic. The amount of time just depends on the number of teeth, the location of the lesion and behavior. Let's say you're doing a simple central, like the video, 30 minutes. Now, if you're doing multiple quads or tougher things like Molar-incisor hypomineralization, that was another thing that popped up or like what some people call hypoplasia. Those you want to give a little more time like a good hour, hour and 15 minutes. We call it a late AM appointment. We like to put it before lunch. That way let's say we run long, we're running into lunch versus screwing up the rest of the patient's schedule and getting behind.

Now, as far as who can do this procedure, it depends on your state law. Now, if we're talking about the anterior surface, I am doing this with an assistant. Now, in the last lecture where we talked about proximal resin infiltration for posterior, technically that could be done by a hygienist by themselves or even a dental assistant by themselves doing the proper technique, of course. But when it comes to this and the anterior and the fact that you really can do some damage, to me this needs to be done ... I'm too much of a control freak to let anyone else make the judgment calls on how many times to etch or how long to infiltrate, yada-yada. And you have to use a pick up the hand piece of course to do things sometimes. Now, here's a long-term case. This

was about seven years ago. This is my office manager's mom. Now, as far as papers on how long it lasts, this one was looking at it four years later. Really nice result there.

This is a patient of mine that went on to whiten and I just wanted to demonstrate that the lesions were stable. Here's some examples and I think I also saw, "Well, how do you know if it's congenital and not?" Well, there's a couple clues, like an ortho white spot lesions tends to literally be that ring around the bracket. It's usually up near the gumline, places where plaque accumulates. Whereas these smooth surfaces of incisal edges it's kind of hard to get decay down there. That's typically a hint. And then obviously like if it's erupting looking like that. Here is another nice result. This was probably a [mileneurosis 01:04:11], would be my best guess on that. They were really happy with that. Now, here's one, I did a bad job polishing that. See, you learn in hindsight. I should have smoothed that better. Actually, that's pretty good. I wanted to show you an example.

Okay. Like this one, I can still see the spot [inaudible 01:04:38]. This is right after and the teeth are still a little dehydrated, so maybe in time it'll look better. And this is a long time ago. This is probably from like 2014, 2015. Like today I would just infiltrate longer. But just to show you that you can't guarantee you're going to get the spot out 100%, but this is a significant improvement to me. At least at a conversational distance, it's getting way that's the stark chalky white. I call these snake bite, these really draw attention to them. So, the patients are really happy. And here's another one. Of course this is immediately after. Maybe in time it looked better, but you can still see a little bit of that spot, but significantly better.

Ortho. Let me get to that really tough. Ah, yeah. This is the one I wanted to show you where even with the rubber dam, I gave them really low expectations. She had phase one of braces for maybe like seven, eight months. Talk about a train wreck. And she came as a second opinion because others were, I can't even remember what they were wanting to just basically drill and fill them all which ... She was really nervous so then she was thrilled

afterwards. The mom was thrilled. This is what she put for our review she said, "She did a miracle on my daughter's teeth." Aw, thank you. Two weeks later, see how the soft tissue healed nicely.

Yeah. I think it's a great outcome. More fluorosis. Again, it's not going to look chalk white, like the fluorosis lesion it's going to look like the natural hue of the tooth, which could in fact look more yellow if the natural undertone of the tooth has more of a yellow hue, but they could always go on to whiten. Here's MIH, these are tougher, they can be kind of yellow. They tend to be deeper into the tooth but it's still a significant improvement. Now, we keep everything in a binder and we have before and after images that will show. Let's say a patient comes in and they bring up the spots, you have to be really careful because it's not ... I don't want to ever make someone self-conscious of something that doesn't bother them, but let's say it comes up or maybe you can say, "Does this bother you?" Or maybe there's white spot lesions and you review how those could become cavitation, we talked about this as an option and show before and after images. We have product information and there. You can get these free from DMG and they've updated on they're really nice now. I think I have a picture of the newer versions.

And here's those resources again on what states allow hygienists and assistants to do resin infiltration, but I would strongly recommend to do it for posterior, not the anterior. And you can combine this with other therapies. Sometimes if there's a lot of brown in the lesion, in the process of doing the procedure after you've etched sufficiently, if there's any brown staining, you could use sodium hypochlorite AKA bleach, but like bleach-bleach, not peroxide whitening and clean those organic proteins out to help lift the brown discoloration before applying the infiltrant. That was a nice improvement for him. Be nice if he would floss, it would help his gums. Apparently it causes facial hair growth. Just kidding. This is a little mustache. Here's a year later, he's obviously missing his laterals, but anyhow a nice confidence booster for him because that was some pretty bad discoloration that he had.

There's that real severe fluorosis case. I pretty much threw the kitchen sink at him. They couldn't afford braces. What a tough situation, so not 100% better, but it's a significant improvement just to help improve their self-confidence because he was only 12 and really embarrassed of his teeth. And just remember that beauty is in the eye of the beholder, they're not always going to have these perfect-perfect outcomes, but it can make all the world a difference to that patient. This is an example I like to give of this young lady. She was 16 at the time, getting ready to go into her senior year of high school. And she had one of the rare, but true metal sensitivities where she had to be disbanded from ortho because she was having all these medical issues. When the braces were off, things went back to normal, like she had legit metal sensitivity.

Did I completely get the spots out? No. Is it a significant improvement? Yes. But what really touched me is when she looked in the mirror, she started crying because she was so happy. It was such a huge improvement to her. So, as providers, as dentists we get very type A and we want perfect, perfect, perfect Chiclets, like go on Instagram and everyone's got all these like perfect, but sometimes even just this subtle change or improvement, this less invasive option can just make a world of difference in these patient self-confidence, so that's great. And these are definitely practice builders. We have patients that call all the time looking for either a resin infiltration providers, like say in other states or they will come from across town and drive an hour to come see us to get resin infiltration. We see a lot of word of mouth internal marketing. You could put it in your practice newsletter, put photos on display. We have them in our waiting room and on our website, you could put it on your blog and social media.

I even did this initially. I went out to different offices and did like a lunch and learn just to

show what we were offering especially to the orthodontist because they typically are seeing these kiddos or adults where the braces are coming off and they maybe have a white spot lesion or something else that they want worked on. It's nice to get referrals coming in the other direction because usually we're sending patients to them. DMG does have an ICON provider directory. Be sure to include yourself on there. And here's some of the newer marketing materials I was telling you about that they did a lot of work updating their websites. Definitely check it out. There's a lot of good resources. There's even like decision trees, some pretty cool stuff on there to help you.

We made a marketing card. We distribute this at various dentists in the area. And it's also good to let the pediatricians know, I think because sometimes the parents are asking like, "What's wrong with my kid's teeth? What can I do?" So, it's good to let people know that you think outside the box and have some tricks up your sleeve. These are two articles I wrote, one for white spots, one for congenital enamel defects. And I have them on that resin infiltration tab on my website or you could download it from DMG as well, but these are nice to give, if you're offering it, you can give more information. If they want to think it over or whatever. It's a nice one. And look at that finishing on time. Boom. And here's more resources for you.

I mentioned the website, which is [kidsteethandembraces.com](http://kidsteethandembraces.com). That's where you have, there some downloads. Our YouTube channel is Affiliated Children's Dental Specialists. That video that I showed you, the technique video, it's here. You can access it openly, so you can subscribe on our YouTube. My Instagram is @drmaclean and then the practice is @affiliatedchildrens. I have the longer version of this website, which has Etch Bleach Seal and MI Paste. You can look at that. And now let's do some questions.