

Dental Erosion: An Increasingly Common Cause of Dentin Hypersensitivity

The role of erosion in the development of dentin hypersensitivity.



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Dental erosion is not a new condition, although researchers and clinicians agree it is becoming much more prevalent. Simply put, erosion is a surface-softening lesion in which loss of tooth structure occurs as acid demineralizes exposed tooth surfaces. As erosion progresses, enamel becomes thinner, the tooth will appear more yellow, and the surface will become smooth and dull with loss of texture. Advanced erosive lesions expose the dentin. At the cervical margin only a small amount of enamel loss will expose dentin. As erosion softens the enamel surface, the physical wear of abrasion or attrition accelerates the damage. In contrast, caries is a bacterial infection.

Erosion and Hypersensitivity

Erosion is considered the most important factor in the development of dentin hypersensitivity. Both conditions have been increasing over the past two decades and are now modern-day epidemics that may affect all age groups.

Erosion is characterized by repeated acid attacks that dissolve hard tooth structure over time. The source of the acid can be either intrinsic or extrinsic in nature. Today's dietary intakes and medical conditions, such as reflux, anorexia, and bulimia, are major risk factors for erosion and subsequent hypersensitivity.

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Extrinsic Factors

Extrinsic dietary acid sources are numerous and include many beverages, fresh and dried fruits, sour-flavored confections, medications, and nutritional supplements or lifestyle practices. The list of highly acid beverages continues to grow and now includes carbonated drinks, sports drinks, iced teas, flavored waters, juices, fruit-flavored drinks, powdered drinks, beer, and wine. Sour acid candies and other confections also contain citric acid. Some brands of bottled waters are in a pH range of 5 to 5.5, which has the potential to affect exposed root structure. Relatively weak acids (pH closer to neutral 7.0) are capable of demineralizing dentin. The “critical pH” for enamel demineralization is pH 5.5, yet the “critical pH” for dentin is only pH 6.5. Therefore when dentin is exposed, it can be eroded much faster than enamel as it is vulnerable to more erosive sources.

Consumption of carbonated beverages by adolescents is on the rise increasing the risk of erosion. Both sugared and artificially sweetened beverages may be erosive. The most common acids are citric acid and phosphoric acids. Citric acid is generally the most harmful acid because, although it has a higher pH than phosphoric acid, it has chelating properties, which result in a greater overall loss of calcium from mineralized tissues.

Beverages that contain multiple organic acids, such as energy drinks, are known to keep the pH low for protracted periods of time, often three times longer than a standard carbonated drink. A more accurate picture is drawn when titratable acidity is calculated because this measures the actual amount of alkali it takes to return to neutral after an acid attack rather than pH, which measures the relative acidity (availability of H⁺ ions) at a particular point in time.

Medications and nutritional supplements also play a role in erosion. Cough drops, liquid medications, and chewy candylike vitamins can contain citric acid as a flavor enhancer, subsequently altering oral pH values. Chewable vitamin C bathes the teeth in ascorbic acid and chewable aspirin can have a negative effect on tooth surfaces. Dry-powder asthma inhalers, especially those formulated with lactose, are also acidic in nature.

Many mouthwashes are acidic, typically around a pH of 4. While most people use these preparations once or twice a day, those concerned about halitosis may be rinsing numerous times per day. Swishing an acidic solution, such as a mouthrinse, is harmful because of the turbulence of the solution and the fact that it flushes the calcium away from the tooth, inhibiting remineralization.

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Many people also add lemon to water as a flavor enhancer. Numerous websites tout the benefits of drinking warm lemon water to enhance weight loss, aid in digestion, or balance the body's pH.

Consumption patterns are another part of the puzzle. Many times, people literally have their beverage of choice with them at all times. Eating on the go and frequent snacking often replaces sitting down to eat a traditional meal. People sip on drinks all day long and graze on bites of food throughout the day, so *frequency* is more important than *amount*. Some swish beverages around their mouth (eg, degassing a carbonated drink) before swallowing and this makes the beverage even more harmful. Today's children grow up with sippy cups, often full of juice or other types of acidic beverages, which parents and caretakers may mistakenly consider to be healthy. The oral cavity can have dozens of acid exposures that keep the oral cavity at an erosive pH level for protracted periods of time.

Saliva composition and flow rates play a role in the erosion puzzle. Healthy saliva has a pH range from 6.5 to 6.8, a relatively neutral point. However, some people have poor buffering capacity, which limits saliva's neutralizing properties. In addition, xerostomia reduces the ability of the mouth to self-cleanse, increases biofilm stickiness, and favors the proliferation of acid-producing and acid-tolerant bacteria.

Intrinsic Factors

Intrinsic factors that increase the risk for erosion involve any condition or activity that causes gastric acid to enter the oral cavity, as in Gastroesophageal Reflux Disease (GERD). Potential triggers for regurgitation include peptic ulcers, gastritis, chemotherapy, alcohol consumption, pregnancy, drug side effects, obesity, bulimia, and anorexic binge eating. GERD increases with age and on average four out of 10 adults experience heartburn (the major symptom) at least once per month.

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Conclusion

Today's modern and convenient lifestyles have accelerated certain disease phenomena, resulting in widespread conditions that are extraordinarily complex to manage. Dental erosion is one of those conditions. As teeth are retained longer throughout life and have fewer restored surfaces, the cumulative effects of lifelong chemical (erosion) and physical wear (abrasion and attrition) are becoming much more apparent. When identified and diagnosed early, at the first signs of surface change, such as loss of texture and shine, or the first twinges of dentin hypersensitivity, prevention by using higher concentration/higher availability fluoride formulations, lower abrasive toothpastes, and dietary modification (addressing the medical causes of regurgitation), tooth surface loss can be arrested and the consequences of hypersensitivity and restoration avoided (Figure 1). When diagnosed late, they pose a significant restorative challenge (Figure 2). Dental professionals are the guardians of oral health. We can have a profound impact not only on oral health and wellness, but on our patients' total health as we address issues of erosion and hypersensitivity.

FIGURE 1—Mild erosion.



FIGURE 2—Severe erosion.



Images courtesy of colgateprofessional.com.

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