Dental caries has long represented a significant oral health issue for children and adults. In the 1980s, however, the prevalence of caries in children steadily declined in segments of the population after the implementation of fluoride supplements and toothpaste, increased public oral health education, and the application of dental sealants.

Since they were first utilized in dental offices in the 1970s, dental sealants (resin based or glass ionomer cement) have been effective in caries prevention. Acting as a barrier, they are typically applied to the premolars and molars where decay is most likely to develop. They have been proven effective in preventing pit and fissure caries, as well as caries on the occlusal surfaces of permanent molars and in high-risk cases.

Over the years, sealants have been implemented in public programmes as a way to reach children of low socio-economic status, who are often susceptible to and often have a high prevalence of caries. Studies regarding the retention rates and clinical benefits of community sealant programmes conducted by county health departments determined that children who received sealants had a 71 per cent successful retention rate and considerable protection from occlusal decay up to five grade.

Other studies indicated that sealants are more effective when placed in patients with established risk factors for occlusal caries, while others have suggested that knowledge gaps remain regarding the costs and benefits of scaling versus high-risk populations. That may partially explain why research regarding caries risk assessment and the use of preventive techniques in children aged 6 to 18 years found that dental sealants and in-office fluoride are the most frequently used caries preventive regimens.

Currently, new and improved dental sealants that are beneficial and cost effective are available for use. They reflect an evolution in which sealants have advanced to become more cost effective, and research shows that properly placed and retained sealants can decrease the occurrence of carious lesions and avoid restorative costs.

Characteristics of dental sealants

The earliest generations of sealants were vulnerable to flawed microhardness, and required replacement over time, which is an essential component of a dental sealant. Studies have shown that self-adhesive sealants do not have the hydrophilic agents in today’s sealants. Nowadays, dental professionals use adhesives that are designed to prevent contamination and sealant failure caused by a weakened sealant bond.

Although third-generation sealants showed improvements, they still had some shortcomings. These sealants were more viscous and easier to handle, and as a result the sealant remained on the tooth surface until it was light cured. However, research showed that light-emitting diodes or halogen lights were insufficient for curing 2 mm-thick opaque sealants or sealants with a high filler content, potentially causing microleakage and insufficient microhardness.

Fig. 1: Pre-op photograph. — Fig. 2: The tooth was cleansed with pumice and a prophy angle. — Fig. 3: Ultra-Etch 35% phosphoric acid solution was placed for 20 seconds. — Fig. 4: The tooth was thoroughly rinsed and patted dry. — Fig. 5: The tooth was etched, then air dried and the etch-and-rinse adhesives were applied to the tooth surfaces. — Fig. 6: A small drop of UltraSeal XT hydro was expressed from the brush tip prior to intra-oral application. — Fig. 7: A painting action, UltraSeal XT hydro was applied to pits and fissures. — Fig. 8: Resin was applied to deep fissures and light cured. It is important to avoid pooling the resin. — Fig. 9: The margins were checked and the occlusion adjusted. — Fig. 10: Post-op photograph of the tooth sealed with UltraSeal XT hydro.
Sealants today can last up to as long as ten years if regularly cared for after application. This durability is facilitated by modern technology that permits dentists to view risk factors, and monitor sealant application and overall retention. Additionally, contemporary sealants are radiopaque, making dental procedures easier; radiolucent materials could mimic caries in subsequent radiographs and, therefore, be problematic.

UltraSeal XT hydro
This 53 per cent highly filled and light-curable pit and fissure dental sealant (Ultradent) is radiopaque, methacrylate based and thixotropic. It also contains diurethane dimethacrylate, tri-ethyleneglycol dimethacrylate, and methacrylic acid. Its adhesive properties increase the bond strength of the material to the enamel, enhancing marginal retention and reducing microleakage. The thixotropic nature of the material, combined with its hydrophilic chemistry, prevents sealant failure by pushing moisture deep into the pits and fissures of the tooth on a microscopic level. This prevents moisture-related sealant failure common with earlier generations of hydrophilic sealants. Additionally, the traditional step of pre-treating teeth with a drying agent is eliminated, resulting in faster and more efficient procedures.

The sealant’s fluorescent properties enable visual verification of the sealant’s margins under a UV black light, making it easier to verify and view marginal retention at the time of placement and subsequent examinations. The chemical composition contains and releases fluoride, so no additional treatments are necessary.

Ultraseal XT hydro is available in two shades, Opaque White (clear) and Natural (tooth-coloured material), and is applied using a syringe and InSpiral Brush tip (Ultradent).

Unlike previously introduced sealants, Ultraseal XT hydro sealants and is retained by dentition for long-term results, similar to its predecessor. Additionally, it is free of bisphenol A, as tested by an independent third-party laboratory that confirmed levels of less than 0.00000 per cent.

Case study
A 9-year-old patient presented with deep pits and fissures upon examination. It was determined that applying Ultraseal XT hydro to deep pits and fissures would be the best course of preventive treatment. The tooth was cleaned with pumice and a prophyl angle to remove any debris prior to sealant placement. The brush tip was attached to the Ultra-Etch etchant syringe (Ultradent) containing a 55 per cent phosphoric acid solution. The InSpiral Brush tip was attached to the Ultraseal XT hydro syringe for later application of the sealant.

The fissures of the teeth were cleaned using a micro-etcher from Ultradent. The selected teeth were isolated with cotton rolls to avoid saliva contamination. Etchant was applied to the fissures of the teeth for 20 seconds. The teeth were thoroughly rinsed with a water spray unit and dried with an air abrasion unit. It was necessary to repaste and rinsing in cases in which sodium bicarbonate was used.

Prior to applying the sealant, a small drop of Ultraseal XT hydro was expressed on to the InSpiral Brush tip. In order to prevent premature polymerisation of the dental sealant, the overhead light was re-directed, and the sealant was applied using a painting action, followed by light agitation. The sealant was light cured using the VALO LED curing light (Ultradent) for 10 seconds. It is recommended that clinicians and patients wear UV protective eyewear when the sealant is cured to prevent injuries. The sealant margins were examined with a Black Light lens (Ultradent) to verify marginal retention visually. The occlusion was examined and appropriately adjusted.

Conclusion
Sealant placement remains an integral component of preventive dentistry. Ultraseal XT hydro is an innovative dental sealant that is easy to use, cost effective, and clinically proven to help prevent the formation of cavities in pit and fissure areas.

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