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A proven one step procedure, now better than ever

Extreme simplicity and reliability with the new SonicFill™ 2 bulk fill composite system
Dr. Rainer Tilse

A complicated endodontic retreatment using a new cordless obturation system: A case report
Dr. Garry L. Bey

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![Graph showing bond strength comparison](image)

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![Comparison of before and after aging](image)

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Extreme simplicity and reliability with the new SonicFill™ 2 bulk fill composite system

Dr. Rainer Tilse

Dr. Tilse graduated in dentistry from the Berlin Free University (North) in 1990. His postgraduate research was carried out at UCLA Dental School, Oral Medicine Department. 1990: Dr. med. dent. (Department of oral surgery, Prof. Dr. P. Reichart). Returning to Berlin, he worked in a private practice, then relocated to the University Hospital of Freiburg im Breisgau, Department of Prosthetic Dentistry (Prof. Dr. J. Strub) as an assistant professor. Since 1993 he has run his own private practice in Pforzheim in partnership with four colleagues. His research covers: aesthetic filling therapy, prophylaxis, oral surgery, periodontics, implantology, and high quality restorations.

The acceptance by patients of dark grey and mercury-containing fillings has decreased over time. For a long period American dentists favoured amalgam, however they now complete the majority of posterior restorations with composite materials.

Composite restorations in posterior teeth are, in fact, a strenuous and time consuming procedure. In order to achieve a comparable margin of quality and longevity, the standard was to place the material in thin layers and cure it step by step. Due to the chemical and physical properties of the conventional materials, it is necessary to go through a number of steps. Shrinkage stress, volumetric shrinkage and complete curing could only be controlled if the materials were used in layers not thicker than 2mm.

In 2011, Kerr introduced SonicFill to the market, a composite that has special properties and allows a more ergonomic procedure. The application happens using a special handpiece made in collaboration with KaVo that is now part of the SonicFill system. As a result of the action of the handpiece, the highly viscous material is turned into a low viscous consistency similar to a flowable. This enables a simple and safe placement into the cavity, making the use of a flow material as a cavity liner unnecessary. After placement, the material slowly regains its highly viscous consistency. This is the ideal working time for modelling and contouring the occlusal surface and removing the excess.

The placement of the material is completely different to the conventional technique, but the workflow follows typical dental movement patterns. The foot pedal starts the action of the handpiece and the delivery of the material. Using KaVo units, the speed of delivery can be controlled either with a movement of the foot pedal or a speed dial control in the handpiece. During the placement, the tip of the instrument is moved gradually through the cavity, starting at the bottom of the cavity slowly moving and swivelling up to the occlusal margins. It is helpful to leave the tip of the capsule in the material, so the composite is pushed along into
The release of the foot pedal stops the action. This step follows typical dental intuition; it is very similar to the movement we perform applying impression material to a tooth following preparation.

A 38 year old patient attended the clinic with a defective filling restoration and caries on a maxillary first molar, as shown in Fig. 1. Under local anaesthetic, the old filling and caries were removed using a pear-shaped diamond bur (Fig. 2). to isolate the operating field, an anatomically-preformed rubber dam (OptiDam) was placed and fixed with a plastic clamp (SoftClamp, Fig. 3). The enamel was etched with 37.5 percent phosphoric acid (Gel Etchant, Fig. 4). The dentine and the enamel were bonded with OptiBond FL (Fig. 5). After placing a contoured matrix (MetaFix size L, Fig. 6), the cavity was restored with SonicFill 2. Starting at the bottom of the cavity, the SonicFill instrument was rotated and the tip simultaneously moved through the cavity upwards to the occlusal surface (Figs. 7-12). The cavity was filled following a “true-bulk” technique in one step. Following placement of the material, the occlusal anatomy was carved and the excess removed with a spatula (Figs. 13-15). The composite was cured for 10 seconds on the occlusal surface (Fig.16); then, after removing the matrix, the composite was light cured for 10 seconds on the vestibular and palatal aspects using a high power LED (Demi Ultra). The contoured matrix (MetaFix) was used as it can be easily removed with a quick pull with the tip of an explorer (Figs. 17,18). The restoration was finished with a fine-grain diamond bur (Komet 368 EF, Fig. 19) and flexible sand-paper discs (FlexisDisc, Fig. 20). Opti1Step Polisher (Fig. 21) were used for the polishing, followed by OccluBrush brushes for high gloss (Figs. 22,23).

Conventional layering technique demands a number of work steps and needs a lot of tiring instrument and hand movements which are eliminated when using the SonicFill technique. The SonicFill handpiece significantly facilitates the delivery of the material into the cavity, especially in hard to reach areas and where there is poor visibility. High quality posterior restorations can be performed with significantly reduced effort, with similar results to the conventional layering technique. Scientific studies have shown no significant differences between both techniques regarding margin quality, adaptation and depth of cure. Clinicians use the layering technique in order to achieve a satisfactory interproximal contact point. In this technique, the first step is to place a small cervical increment and use an instrument to press the matrix towards the adjacent tooth during light curing. This can lead to the formation of an incorrect proximal contact. Anatomically-contoured matrices like the Kerr MetaFix facilitate predictable and precise interproximal contact points, even when the material is placed in a single step technique.

QuiXfil (Dentsply) has been a pioneer in bulk fill composites and it is known for its transparency. Five years earlier, a QuiXfil restoration had been placed on the adjacent premolar. The final picture demonstrates vividly the development of bulk fill materials in the last five years. The QuiXfil restoration can be classified as clinically acceptable, although the aesthetic results are poor. SonicFill 2 can be cured up to 5mm in depth with no negative aesthetic appearance, rather it impresses with its enamel-like look (Fig. 24).

Four years after the SonicFill launch, Kerr has introduced the second generation of the successful restorative composite as SonicFill 2.
Unique properties like the reaction to ultrasound and the pronounced liquefaction have been retained along with exceptional mechanical properties and reduced stress polymerisation. The working time after placement has been extended, so the practitioner can shape the occlusal anatomy without time pressure and avoid tedious finishing. This is a critical improvement as bulk materials tend to “freeze” under powerful operatory overhead lights, if the lamp cannot be switched to a “composite mode” like the KaVolux 540 unit. The handling of the new SonicFill 2 is somewhat smoother/sleeker/more malleable, without any stickiness. The new restorative enables a long-lasting high gloss without any effort. Kerr has listened to the voice of its customers and achieved a tremendous improvement with the new SonicFill 2.

References:
SonicFill™ 2: a second generation bulk filling material

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Introduction

Although resin-based materials are the newest to join the dental restoration family when compared to amalgam and ceramics, they have achieved wide popularity among dentists and are increasingly being used in direct restorative techniques.

Polymerisation shrinkage remains one the main shortcomings of resin-based restorative materials, despite improvements over the years. To overcome this problem and achieve an adequate degree of conversion, conventional composites were applied in layers not exceeding 2mm of thickness.

Bulk filling materials

Introduced into dentistry five years ago, bulk filling materials are now considered in a category of their own among resin-based materials and are being used by an increasing number of dentists.

When searching for “bulk filling composites” on the NIH PubMed website, 96 references were found, all showing results of in-vitro studies.

Different categories of those materials are available in different consistencies and application methods: flowable base, high viscosity base, high viscosity composite and sonically activated resin composite.

Mainly indicated in medium-to-deep posterior restorations, bulk filling materials are used in layers up to 5mm in thickness. Prior to their application, a matrix system is applied on class II cavities, followed by an adhesive system (total-etch or self-etch) to ensure the retention of the composite in the cavity.

SonicFill

The SonicFill system is a sonically activated, high density bulk fill material indicated for class I and class II posterior restorations, and as a build-up material for cusp reconstruction.

The handpiece is manufactured by KaVo and the Unidose composite tips are made by Kerr and are available in 4 shades (A1, A2, A3 and B1). Using a KaVo Multiflex connector, the handpiece is connected to the dental unit. The use of the SonicFill system combined with a self-etch adhesive represents a real gain in time for the dentist when compared to the layering technique.

SonicFill is the only high viscosity, sonically activated bulk fill system that is used without any additional occlusal protection. Several in-vitro studies have shown that SonicFill has excellent physical and mechanical properties, as well as a high degree of conversion (Alrahlah et al, 2014; Leprince et al, 2014). Clinically, it has been noted that SonicFill required additional chair time to achieve optimal polishability. Additionally, SonicFill showed high sensitivity to ambient light, shortening the working time.
Second generation

Kerr has recently introduced a new formulation – SonicFill 2 – that offers an improvement in the aforementioned areas, allowing ease of polishing and an extended working time. Along with the polishability, an improvement in wear resistance is also observed, which can be considered another benefit. Despite the changes, SonicFill 2 has physical and mechanical properties comparable to the original version, such as strength, shrinkage stress and high depth of cure.

Retaining the same patented sonic-activation technology that made the original version so successful, special rheological modifiers in the SonicFill 2 filler have a dramatic reaction to the sonic energy applied through the handpiece during placement. This reduces the viscosity of the material by up to 84 percent, making it similar to a flowable, ensuring close adaptation between the composite and bonded surface. The new filler system, a high-strength pre-polymerised filler, which is a nano agglomeration of zirconium oxide and silica oxide particles, enables excellent gloss, colour-matching, wear resistance and strength to make bulk filling even easier and more reliable.

Clinical case

The following clinical case illustrates the restoration of two maxillary molars (16 and 17) using SonicFill 2.

A 39 year old woman attended for a consultation. Clinical examination showed a defective composite restoration on tooth 16 and a defective restoration with a fractured margin on tooth 17 (Fig. 1), while radiographic examination revealed two significant radiolucencies that needed to be treated (Fig. 2).

Following anaesthetisation of the patient, cavity preparation was achieved using diamond pear-shaped burs under copious water irrigation. Additional decay was removed using a round carbide bur on a contra-angle handpiece. The working field was isolated using a preformed 3D rubber dam (OptiDam) fixed with a SoftClamp and FixaFloss. To avoid any gingival fluid contamination, an additional ligature was applied to tooth 16 using dental floss (Fig. 3). Following rubber dam application, a medium-sized MetaFix matrix was placed around tooth 16 and tightened manually, as indicated by the manufacturer. Two wooden wedges were inserted mesially and distally to avoid any gingival overhangs (Fig. 4).

OptiBond XTR, a sixth generation, two component self adhesive system, was used according to the manufacturer’s instructions. The self-etch primer was applied using a microbrush, scrubbed for 20 seconds (Fig. 5) and then gently air dried (Fig. 6). The bonding resin was then brushed actively for 15 seconds to allow better penetration in the dentine tubules, air thinned for 5 seconds (Figs. 7 and 8), and polymerised for 20 seconds using the new LED Demi Ultra curing light based on capacitor technology (Fig. 9).

The cavity was restored using SonicFill 2 Unidose tips (shade A2) applied in one 5mm layer (Figs. 10 and 11). The composite was adapted using a ball spatula, sculpted and polymerised for 20 seconds (Fig. 12). Following matrix removal, the proximal contour of the restoration was polished using the OptiDisc system to ensure an adequate and anatomical contact point between the two molars. A new MetaFix matrix was applied and the same adhesive procedure repeated for tooth 17 before restoring the cavity with SonicFill 2 (Fig. 13). Fig. 14 illustrates the two completed SonicFill 2 restorations prior to rubber dam removal.
Finishing and polishing of the composite restorations require two different steps that must remain separate. After marking the occlusal excess and interferences with articulating paper, finishing was achieved using an egg-shaped fine diamond bur (Fig. 15). This was followed by a silicone point and an OccluBrush, a silicone filled brush used to give a high lustre and polish to the restorations (Figs. 16 and 17). Fig. 18 is a postoperative view of the final restorations after finishing and polishing.

Fig. 19 shows a digital radiograph of the two SonicFill 2 restorations, demonstrating perfect adaptation of the composite to the margins of the cavity.

Conclusions

Eight years ago, when I tried the first prototype of SonicFill, I felt very sceptical. I wondered what the benefits of this device were and whether we really needed it. However, following all the fine tuning and improvements that this handpiece has undergone, and after more than five years of clinical use and hundreds of restorations achieved, I can say that SonicFill is a great system and a must in every clinic performing restorative dentistry.

The use of bulk filling materials is constantly increasing and improving, and without doubt it has modified the traditional concept of layering technique, at least in posterior restorations. When combined with a self-adhesive system, a clear gain in time is observed, the number of steps is reduced, minimising the risks of failures or errors, and clinical predictability is increased.

References

A proven one step procedure, now better than ever.

The SonicFill system enables clinicians to perform posterior restorations with an easy to use, one step procedure that provides everything you need for reliable bulk filling: the adaptation of a flowable during placement, a high depth of cure, low polymerisation shrinkage stress, and the strength and aesthetics you’d expect from a posterior restorative.
OUTSTANDING ADAPTATION
Thanks to viscosity drop during placement.

OPTIMAL MARGINAL INTEGRITY
Thanks to lower shrinkage stress than other bulk fill or conventional composites.

EXCELLENT FLEXURAL STRENGTH AND POLISHABILITY
Thanks to the new nano-scale zirconium oxide filler system.

HIGH DEPTH OF CURE
Up to 5mm polymerisation depths thanks to refractive index matching.
A complicated endodontic retreatment using a new cordless obturation system: a case report

Dr. Garry L. Bey
D.D.S.

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The main objective of endodontic treatment is the prevention and/or the elimination of apical periodontitis. This is achieved by instrumentation, disinfection, and obturation of the root canal system in three dimensions. Gutta-percha is the most widely used and accepted obturation material because of its biocompatibility, inertness, dimensional stability, compactability, plasticity when heated, and ease of removal for post placement or retreatment.1

There are a variety of techniques that are used to obturate the root canal system. They can be divided into two basic groups: cold lateral compaction and warm vertical compaction. Warm vertical compaction of gutta-percha using the continuous wave of condensation technique is less time consuming, provides less microbial coronal leakage,2 and adapts better to grooves and depressions of the canal walls and lateral canals than cold lateral compaction.3,4

This case report presents the retreatment of a three-rooted maxillary first bicuspid using the new elements™free cordless obturation system by Kerr (Fig. 1).

The continuous wave of condensation technique using the elements™free cordless obturation system

This technique allows a single-tapered electric heat plugger to capture a wave of condensation at the orifice of a canal and ride it, without release, to the apical extent by downpacking in a single, continuous movement. Because the tip moves through a viscosity-controlled material into a tapered-like canal form, the velocity of the thermo-softened gutta-percha and sealer moving into the root canal system actually accelerates as the downpacking progresses, moving softened gutta-percha into extremely small ramifications (Figs. 2a, 2b, 3). The continuously tapered root canal preparation facilitates the fit of a suitably sized gutta-percha cone by Kerr (Fig. 4).
The master cone selected should be inserted to full working length and exhibit apical tugback (resistance to displacement) upon its removal. It is simple to fit a master cone into a patent, smoothly tapered, and well-prepared canal.3-8 The intimacy of diametrical fit between the cone and the canal space may be confirmed radiographically.

The cone may then be trimmed about 0.5 to 1mm from the radiographic terminus so that its most apical end is just short of the working length to accommodate vertical movement of the vertically condensed gutta-percha cone.

The heated plugger of the downpack device (most commonly a .06 or .08 taper with 0.5mm diameter) should fit within 4 to 7mm from the apical terminus to allow full thermo-softening of the apical gutta-percha plug. When the tip of the plugger comes into contact with the dentine (the binding point) in the canal, the rubber stop should be adjusted to its corresponding occlusal reference point (Fig. 5). Stainless steel pluggers may be pre-fit into the canals to their binding point in preparation for the backfilling. Rubber stoppers are adjusted on these pluggers to the occlusal reference point corresponding to 2mm short of the apical binding point. These pluggers are placed aside to be used later in the backfill phase of canal obturation (Fig. 6).

Sealer and master cone placement

The amount of sealer used in this obturation technique should be minimal. The radicular portion of the master cone is lightly covered with sealer and the cone is gently slid to length. Placing the master cone in this manner will serve to distribute sealer more evenly along the walls of the preparation and, importantly, allow surplus sealer to harmlessly vent coronally5-8 (Fig. 7).

Both the downpack and backfi devices of the elementsfree obturation system may be pre-heated by depressing the “jump start” button, which is located in the centre of the docking station. This will allow a seamless technique with no down time. The downpack handpiece is activated by depressing the activation ring with a gloved finger. The tip will remain heated only as long as the ring is depressed. A “time-out” feature in the elementsfree downpack handpiece assists the clinician by shutting off the energy to the tip after four seconds. This will aid in avoiding overheating of the tooth and/or tissue. The handpiece will need to be reactivated by depressing the activation ring to resume heating beyond the preset duration.

The master cone is seared at the orifice of the canals with the activated heated plugger, and then gently “seated” with a larger stainless steel plugger. The activated heated plugger is driven through the centre of the gutta-percha in a single motion (about one to two seconds), to a point about 3 to 4mm shy of its apical binding point (Figs. 8 and 9). While maintaining pressure on the plugger, the activation ring on the downpack handpiece is released and the plugger will slow its apical movement as the plugger tip cools (about one second) to within 2mm of its apical binding point. After the plugger stops short of its binding point, apical pressure on the plugger is sustained until the apical mass of gutta-percha has set (five to 10 seconds), to minimise any shrinkage that occurs upon cooling (Fig. 10).

Separation burst

After the apical mass has set, the activation ring on the downpack handpiece is depressed again, for a one-second surge of heat. Pause for one second after this separation burst, and then remove the heated plugger and the middle and coronal gutta-percha leaving behind the 4 to 6mm apical plug of gutta-percha (Figs. 11 and 12).

Because these pluggers heat from their tips, this separation burst of heat allows for quick, sure severance of the plugger from the already condensed and set apical mass of gutta-percha, minimizing the possibility of pulling the master cone out. Be certain to limit the length of this heat burst, as the goal is separation from the apical mass of gutta-percha without reheating.
Clinicians must be very alert during the first second of the downpack so that the binding point is not reached before completion of the downpack. If heat is held for too long, the plugger drops to its binding point in the canal and then cannot maintain condensation pressure on the apical mass of gutta-percha during cooling, possibly allowing it to pull away from the canal walls. If binding length is reached by mistake, the heat plugger should be removed immediately and the small end of the nickel-titanium end of a Buchanan hand plugger (Kerr) may be used to condense the apical mass of gutta-percha until set.

Backfilling

The elementsfree backfill handpiece accommodates disposable preloaded cartridges of gutta-percha of varying densities. The applicator tips are available in 23-gauge and 25-gauge diameters. The combinations are as follows: 23-gauge medium body, 23-gauge heavy body or 25-gauge light body.

There is enough gutta-percha in the disposable cartridges to fill an average four-canal molar. The author prefers to use the heavy body gutta-percha and a 23-gauge applicator tip as they are suitable for most canals treated. The applicator tip is placed into the root canal space until it penetrates the coronal aspect of the apical plug of gutta-percha for five seconds to thermo-soften its most coronal extent again. This procedural nuance promotes cohesion between each injected segment of warm gutta-percha and the apical plug so the two will seamlessly integrate; segments to of 5 to 6mm of gutta-percha are then deposited. Injecting or dispensing too much gutta-percha may lead to cooling shrinkage and/or voids, which result in poorly obturated canals within the deeper confines of the root canal space. As gutta-percha is extruded from the applicator tip, the viscosity gradient of the back pressure produced will push the tip coronally from the root canal space. The technique sensitivity requires that when this sensation occurs, the operator must sustain pressure on the activation button mechanism as the applicator tip moves from the canal. The stainless steel or nickel titanium ends of the Buchanan hand pluggers are then used in sequence to maximise the density and homogeneity of the compressed gutta-percha mass. This sequence of thermo-softened gutta-percha injection and progressive compaction is continued until the obturation of the entire root canal space is achieved. (Figs. 13-19)

Case Report

A 24 year old Caucasian female with a history of pain was referred for evaluation and retreatment of tooth #24. Tooth #24 had root canal treatment previously performed by a general dentist approximately three months prior to being seen in our office. Upon initial exam, a preoperative intraoral digital radiograph (Dexis, Alpharetta, GA) showed that this maxillary first bicuspid had three roots (Fig. 20). The mesiobuccal and palatal canals appeared to have been
adequately filled. The distobuccal canal was filled short. A cone beam computed tomography scan (CBCT) of the left maxilla was performed with limited FOV at 76μm (Kodak 9000; Carestream Dental, Atlanta, GA) and revealed the distobuccal root with periapical pathology (Fig. 21) and a patent canal (Fig. 22). Clinically, there was leakage around the temporary filling. The treatment plan decided and ultimately agreed upon was endodontic retreatment of all three canals.

Appointment one

Access was made through the temporary filling with a number 6 surgical length round bur in a slow speed handpiece. The gutta-percha from all three canals was removed and a glide path was created from orifice to apex using hand files. The canals were instrumented to the apex to a size .04/35 Twisted File used in an Elements Motor (Fig. 23) using Adaptive Motion (Kerr).

Calcium hydroxide was placed in each canal with a lentulo spiral, a sterile cotton pellet was placed in the pulp chamber and the access cavity was sealed with Cavit W (3M ESPE). The occlusion was reduced. The patient was prescribed Amoxicillin 500mg, dispense 30, sig: 1TID.

Appointment two

The temporary restoration was removed with a number 6 surgical length round bur in a slow speed handpiece and the mesiobuccal and distobuccal canals were enlarged to a 45 LSX LightSpeed file (Kerr) to their apices. The palatal canal was enlarged to a 50 LSX LightSpeed file to its apex. A final irrigation protocol was performed using apical negative pressure employing the EndoVac (Kerr).

The protocol suggested uses three irrigation cycles. The first cycle uses sodium hypochlorite 5.25 percent, followed by a second cycle using 17 percent EDTA, followed by a third and final cycle using 5.25 percent sodium hypochlorite. The canals were then dried and obturated using the continuous wave of condensation technique with the cordless elementsfree cordless obturation system (Kerr) (Fig. 25).

Discussion

The objective of endodontic obturation is the total three-dimensional filling of the root canal system and all of the lateral and accessory canals associated with it. Brothman demonstrated that vertical compaction of warm gutta-percha approximately doubled the number of filled lateral canals compared with lateral compaction of warm gutta-percha. The warm vertical technique has shown greater ability...
to flow into canal irregularities than the cold lateral technique.\textsuperscript{10,11} Warm vertical compaction was first introduced by Schilder\textsuperscript{12} in 1967. With this method, gutta-percha is heated and packed in three to five interrupted waves of compaction. In contrast, the continuous wave of condensation technique was introduced with the goal of simplifying traditional vertical compaction.\textsuperscript{13} This technique allows a single tapered electric heat plugger to capture a wave of compaction pressure at the orifice of a canal and ride it, without release, to the apical extent of the downpack in a single, continuous movement.\textsuperscript{14} The remainder of the canal is then filled with a backfill device. Endodontic retreatment presents the clinician with many challenges. Among them are the removal of posts, cores, foreign objects and root canal filling materials that might be within the root canal system. Once this is attained, the root canal system is prepared, disinfected, and obturated. In this case obturation was accomplished using the cordless elementsfree obturation system (Kerr Endodontics). The cordless feature allows freedom of movement during treatment. The omnidirectional activation ring on the downpack unit is easily depressed, independent of the position of the plugger in the canal. The swivel movement of the needle tips and the extrusion action of the backfill device make delivery of gutta-percha efficient, easy and precise, leaving no voids in the final outcome.

Conclusion

Although maxillary first bicuspids with three roots do exist both in the literature and in practice, they are rare. Retreatment of a tooth with this type of anatomy is a perfect example of why proper instrumentation followed by efficient irrigation leads to superb obturation. A new elementsfree cordless obturation system was used in this case. Its ease of use and efficiency provide a promising advance in the field of endodontic obturation.

References available upon request.
Flowable resin composites: convenience, versatility and predictability. a clinical case with new Herculite® XRV Ultra™ Flow

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Qualified at the University of Liverpool in 1984, and maintains a private practice, The Ridgeway Dental Surgery, focusing on implant, advanced aesthetic, prosthodontic and restorative dentistry. His academic achievements include nearly 200 publications pertaining to a variety of dental disciplines, the sole author of five dental textbooks, and has contributed to several other books by eminent authors. He is a member of the prestigious European Academy of Esthetic Dentistry (EAED), founding member of the International Academy for Adhesive Dentistry (IAAD), Honorary Professor of the Ukrainian Medical Dental Academy, and serves on the editorial review board of the Journal of Cosmetic Dentistry (JCD). As well as lecturing in the UK, Irfan Ahmad is a popular invited speaker, having lectured in nearly 30 countries across four continents, including Europe, the Middle East, USA, South America, Russia, Scandinavia and China. www.great-teeth.co.uk

Introduction

Flowable resin-based composites (flowables) were introduced to the dental profession more than two decades ago. Since their inception in the late 1990s, they have become one of the most popular dental restorative materials on the market. The reasons for their popularity are convenience, versatility and predictability, predominantly due to the endearing property of being ‘flowable’. However, the rate of fluidity or viscosity is not uniform, and each flowable composite displays varying degrees of viscosity depending on the proprietary brand. Furthermore, besides flowability, specific flowables display different physical, mechanical, aesthetic and handling characteristics. In addition, because flowables have apparently similar handling and comparable properties to resin-based luting cements, orthodontic bracket cements and fissure sealants, they are often inappropriately substituted. This article presents an overview of flowables, including properties, advantages, limitations and clinical applications, and a step-by-step guide for using the newly launched Herculite XRV Ultra Flow (Kerr).

Composition and properties

The chemical composition of flowables is similar to conventional resin-based composites used for fillings, but the amount of the constituents is altered to confer lower viscosity. This is achieved either by increasing the amount of organic matrix (monomer) or decreasing the inorganic filler loading, which ranges from 20 percent to 50 percent less than conventional composite formulations,1 or approximately 50 percent by volume or 60 percent by weight.² On a continuum, filler content of flowable lies between dental adhesives (cements) that are unfilled to the other extreme of highly-filled conventional restorative resins. The former allows pliability, while the latter high stiffness, catering for various clinical applications. The lower filler content results in greater polymerisation shrinkage, but is offset by the reduced polymerisation stresses due to the longer setting time to dissipate the forces of conversion of the monomer (un-set material). The advantages of reducing filler content is superior adaptability to cavity crevices for reducing microleakage³ and possibly mitigating post-operative sensitivity,⁴ while enhancing shock absorption (nearly half the modulus of elasticity of conventional composite). However, the trade-off is poorer mechanical properties, such as increased wear and reduced resistance to occlusal forces resulting in deformation and fracture of the restorative. This is due to the lower flexural strengths of flowables, ranging from 70 MPa to 100 MPa, compared to conventional composites of over 120 MPa. However, newer flowables surpass the ISO minimum flexural strength requirements of 80 MPa for stress-bearing occlusal areas. In spite of this, the flexural strength decreases over time, making the material more susceptible to both wear and fractures.⁵

This is further compounded by the lower modulus of elasticity (3 to 6 GPa), which results in lower resistance to deformation, hence making flowables unsuitable for occlusal load-bearing sites. It should be emphasised, regardless of the mechanical properties of any composite, that the most important factor for reducing microleakage, polymerisation shrinkage and stresses, post-operative sensitivity, and ensuring longevity is proper clinical techniques using dentine bonding agents to form a hermetic seal between the restorative material and tooth substrate. Besides favourable mechanical properties, flowables should have low water sorption and low solubility to retain structural and marginal integrity, especially when used in sub-gingival areas as an initial lining layer.⁶ Furthermore, the material should display colour stability, resist discoloration by food and beverage pigments and mouthwash chromogens,⁷ achieve acceptable aesthetics, and high gloss retention after polishing if used in aesthetically sensitive areas.⁸ The addition of fluoride and its release is questionable. A better premise for sustained longevity is ensuring a hermetic seal between dentine/enamel and the flowable resin.
Finally, compared to unfilled resins, most flowables benefit from denser radiopacity than dentine (1.5mm Al thickness) and enamel (2.25mm Al thickness), which helps distinguish secondary caries, visualise tooth and/or material fractures, and identify marginal integrity of the restorative with the surrounding tooth substrate.9

The Achilles heel of flowables is poor resistance to fracture, increased polymerisation shrinkage, and microleakage with ensuing secondary caries. However, with recent innovations, contemporary resins have overcome many of these limitations and failure is often attributed to incorrect clinical application judgment,10 inappropriate techniques, and poor follow up and monitoring.

To summarise, the ideal properties of a flowable should be controlled fluidity for ease of clinical manipulation with thixotropic properties, low polymerisation shrinkage to discourage microleakage, optimum microhardness for sustained resistance to functional wear and fractures.11 This results in longevity and performance,12 lustre retention for optimal aesthetics, and high radiopacity for future diagnostic monitoring.13

Clinical uses

PRIMARY USES OF FLOWABLES

The primary application of flowables are intermediary or lining layers for all classes of cavities between the dentine bonding agent and overlying conventional composite, or restoring inaccessibly deep or sub-gingival areas. Initial lining layers allow stress relieving, minimise microleakage,14 and improve internal adaptation to cavity crevices for achieving a hermetic seal (Figs. 1 to 3).

The other uses of flowables include the following:

1. Definitive restorations of small Class III (Figs. 4 to 8), Class I & VI (Fig. 9) cavities not subjected to load bearing sites, and Class V or Non-Carious Cervical Lesions (NCCL) resulting from erosion, abrasion or abfraction.15
2. Minimally invasive Preventative Resin Restorations (PRR), such as carious pit and fissures lesions using micro-rotary tooth preparation.16
3. Minimally invasive interproximal tunnel restorations17 (Figs. 10 and 11).
4. Blocking undercuts for indirectly fabricated prostheses such as inlays, onlays, porcelain laminate veneers and crowns, and fillings in primary teeth.
5. Failed fissure sealants or incipient decay around previously fissure-sealed teeth. In these circumstances, the fissure sealant can be left in situ, the incipient caries excavated either by air abrasion, lasers or micro-rotary burs, and a flowable composite used to restore the resultant cavity. If the cavity is deep, the flowable can be covered with a conventional hybrid composite, especially if there is occlusal contact with the opposing dentition.18

As mentioned above, flowables are ideal for restoring NCCL or Class V lesions. Conventional, hybrid composites for restoring these lesions show poor success rates in abfraction cavities since the material is stiffer, and less resilient to occlusal stresses. Therefore, using flowables with a lower biaxial flexural strength improves the shock-absorbing capability in these critical clinical situations. Furthermore, the flowability of the material allows better internal cavity adaptation,19 reducing microleakage and post-operative sensitivity.20 However, other studies have cited the importance of the dental adhesive as the crucial factor for success,21 since the C-factor of Class V cavities is small and, therefore, the mechanical properties of a composite plays a less significant role.22

The case study in Figs. 12 to 34 shows a step-by-step technique for restoring a NCCL, or Class V lesion, using a combination of conventional resin composite with an initial layer of a new nanohybrid...
flowable, Herculite™ XRV Ultra Flow (Kerr). The Herculite XRV Ultra Flow has several desirable features including high flexural strength of 124 MPa, less than 3 percent polymerisation shrinkage, high radiopacity, high gloss retention and favourable thixotropic handling characteristics.

SECONDARY USES OF FLOWABLES

Both direct and indirect restorations after years of service may show signs of wear, deficient margins resulting in symptoms of sensitivity or gingival inflammation due to food packing. In these circumstances, replacing the entire restoration causes further trauma and should be discouraged. After removing the offending cause and pretreatment such as bleaching, air abrasion, YSGG (Yttrium Scandium Gallium Garnet) lasers23, or rotary roughening, the defect is readily repaired with a dentine bonding agent and a flowable, and can be periodically monitored. This is particularly relevant for adopting a minimal intervention approach for conservative dentistry, e.g. sealing ditching around amalgam margins (Fig. 35), or intra-oral repairs of minor porcelain fractures.

Other uses include re-lining temporary crowns, reattaching fractured tooth fragments or filling devoid or porosity in transitional crowns or prostheses, and stabilising or splinting (with or without fibre reinforcement) of periodontally-involved or traumatised mobile teeth. However, as previously mentioned, using flowables for cementing indirect restorations, orthodontic brackets or sealing fissures should be desisted, as these materials do not possess the necessary properties and long-term performance, and success rates may be compromised.

Conclusion

The dental profession is perpetually seeking techniques and innovative products for enhancing patient care and facilitating its delivery. Flowable composites fall into this category by offering convenience, versatility and predictability. After nearly two decades, flowables have evolved with improved properties and are indispensable in contemporary practice with a wide range of clinical applications. No doubt, future developments will further improve material characteristics, and open broader and novel uses of these resin-based composite varieties.

References available upon request.
Fig. 15 – OptiDam, SoftClamp and Fixafloss (Kerr) are used to achieve isolation from the mandibular first molar to the central incisor for a clear field of view and to ensure a dry environment for adhesive bonding protocols.

Fig. 16 – A Zekrya gingival protector (Dentsply) is placed to visualise the margin apical to the NCCL.

Fig. 17 – A bevel is created with a 40 µm diamond bur at the coronal aspect of the lesion to achieve a seamless transition between the composite and surrounding tooth substrate.

Fig. 18 – Etching with 37 percent phosphoric acid for 15 seconds is an optional step for increasing the area and depth of enamel etching pattern. Etching is also advisable if there is prevalent sclerotic dentine.

Fig. 19 – Frosted appearance of enamel after rinsing off the etchant and drying.

Fig. 20 – OptiBond XTR (Kerr) primer is applied to both enamel and dentine with a scrubbing motion for 20 seconds, and subsequently air dried for five seconds.

Fig. 21 – OptiBond XTR (Kerr) adhesive is then applied to both enamel and dentine with a light brushing motion for 15 seconds.

Fig. 22 – The Optibond XTR adhesive is air dried for five seconds for a non-porous, smooth shiny surface.

Fig. 23 – The adhesive is cured with a Demi Ultra (Kerr) curing light for five seconds, under the Premier Cure-Shield (Kerr), which blocks potentially harmful ultraviolet and blue light of wavelengths shorter than 525 nanometres.

Fig. 24 – Kolor + Plus A3 Opaque (Kerr) colour modifier is placed to mask the stained dentine.

Fig. 25 – Herculite XRV Ultra Flow composite is dispensed into the cavity to achieve tight adaptation to the internal line and is light cured with Demi Ultra for 10 seconds.

Fig. 26 – Herculite XRV Cervical composite, shade YB, is sculpted with a flat insert of the CompoRoller to complete the curvaceous restoration morphology in the mesial-distal and cervico-incisal planes, and light cured with Demi Ultra for 10 seconds.

Fig. 27 – The final clinical stages involve three distinct phases: contouring, finishing and polishing. The contouring is commenced with a 80 µm diamond bur for mimicking the correct morphology, using the surrounding tooth shape as a guide.

Fig. 28 – The contouring is continued with progressively finer diamond grit burs, e.g. 40 µm.

Fig. 29 – Any residual flash and/or overhanging margins are finished with EVA diamond coated tips (Dentatus) of progressively finer grits (100 µm to 15 µm) in a reciprocating handpiece (KaVo). It is essential that the cervical aspect of the restoration has the correct emergence profile, i.e. the restorative margins are on a tangent with an area apical to the finish line.

Fig. 30 – Finishing and polishing is accomplished using a variety of rotary instruments, including abrasive discs and silicone tips. The objective is to achieve a surface roughness that is below the bacterial adhesion threshold of 0.18 µm to minimise build-up of biofilm and mitigate staining. First, flexible OptiDiscs (Kerr) of varying grits (80 µm to 10 µm), which are capable of achieving a surface roughness of 0.2 µm, are gently and intermittently applied to the surface with handpiece speeds below 10,000 revolutions per minute.

Fig. 31 – The polishing continues with an Identiflex composite polisher cup (Kerr)...

Fig. 32 – ...followed by OptiShine brushes (Kerr), which produce a surface roughness of 0.25 µm...

Fig. 33 – ...and finally, obtaining a high gloss and lustre is accomplished with Opti1Step, which yields a surface roughness of 0.18 µm, below the bacterial adhesion threshold of 0.2 µm.

Fig. 34 – The post-operative result shows the restoration seamlessly blending with the surrounding tooth substrate, hermetically sealed margins, and a high lustre surface with a correct emergence profile.

Fig. 35 – Etched margins around an amalgam restoration in a mandibular molar. Rather than replacing the entire filling, after removing decay the margins can be sealed with a dentine bonding agent and a flowable composite, assuming there is no centric occlusal contact at the margins.
Dr. Sebastiana Arroyo Bote

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She has been an Associate Professor of Dental Surgery and Endodontics since 1992. She has also been a teaching professor for dental assistants since 1996. She has given conference presentations and written articles on restorative odontology and endodontics, and prophylaxis. She has been in private practice in Barcelona since 1985.

Abstract

Every day, greater numbers of patients with special needs attend clinics because of their high incidence of oral pathology and society’s increase in life expectancy. Dental prophylaxis is the most widely used treatment in the monitoring and maintenance of oral health. In this article, the most recent developments and advances in periodontal examination and dental prophylaxis, with their high value for special needs patients, is presented.

Introduction

In dentistry, the term “special needs” comprises two clearly differentiated groups of patients: one consisting of patients with systemic medical pathologies, and the other of patients with physical or mental incapacities.

The increase in life expectancy in modern society and the high prevalence of oral pathologies in those with special needs are resulting in daily increases in the numbers of such patients attending clinics for oral and dental treatments – both restorative and prophylactic.

According to the National Statistics Institute and results from the Survey on Disability, Personal Autonomy and Dependency Situations 2008 (EDAD), there were 3,847,900 people in Spain with some kind of incapacity in 2008, constituting some 8.5 percent of the total population.

The most common oral and dental problems in special needs patients are: caries, periodontal disease, malocclusion, and traumatic and self-induced lesions. All of these pathologies are related to the difficulties these patients have in maintaining adequate oral hygiene, the fact that they generally have a soft, caries-inducing diet, and that their medication has negative influences on the stomatognathic system.

Genetic changes can also occur, leading to orofacial malformations and consequent dental malocclusion. Patients with physical or sensory incapacities have a higher rate of accidents than the healthy population, resulting in more frequent oral trauma. In addition, patients with psychological difficulties or psychiatric disorders, such as Alzheimer’s or Parkinson’s diseases, obsessive compulsive disorders, anorexia, autism, schizophrenia, Tourette’s syndrome, neuroacanthosis, chronic pain syndromes, etc., often present with self-induced lesions, especially bites and blows.

The aim of this article is to provide an update on the indications for prophylaxis appropriate to each patient’s needs, focusing on oral hygiene treatments and the application of various preventive pastes.

The need for periodic monitoring to maintain good oral health is vital in all patients. An annual review is regarded as sufficient for patients not presenting relevant pathologies. However, special needs patients require more frequent monitoring to ensure the best possible maintenance of oral health.

Dental prophylaxis is the most important treatment in maintaining oral health and is, without doubt, a therapy that must be provided to special needs patients when plaque bacteria are present. This is a routine treatment that is generally provided by the dental hygienist or dentist.

However, although routine for some patients, there are a number of stressful situations that arise because of suspected gingivitis and/or mucositis, or dentine hypersensitivity. For this reason, treatment needs to be provided in conditions created to help patients feel as calm and secure as possible, earning their trust – particularly when it comes to special needs patients. Avoiding discomfort and unpleasant tastes helps to improve their confidence in the treatments being provided.

Update on the maintenance and monitoring of oral health in special needs patients
Examination

Dental hygiene in special needs patients can be difficult because of a lack of assistance, as they can have difficulty opening their mouths and often make sudden, unexpected movements. The dental professional should therefore avoid using pointed instruments to avoid injuries caused by unexpected movements by the patient and examination should be performed as quickly as possible.

Lip separators provide for easy visualisation of, and access to, the teeth and mucosa, allowing rapid examination of the oral cavity. Optiview is a mouth opener and lip separator that retracts the lips and cheeks, and is easy to position. Its stable and flexible three-dimensional design provides for quick and efficient positioning and removal. The whole device, including the cushions, can be autoclaved at 134°C for 3 minutes. The lip supports have an opening for the frenulum, making them as comfortable as possible (Fig. 1).

Plastic periodontal examination probes are very useful, such as the Perio Probe (Fig. 2) or the Click Probe forming part of the Click System (Fig. 3), which can be used for a fast and qualitative evaluation of periodontal pockets.

The colour scale provides for rapid determination of periodontal pocket size. The Perio Probe is available with a 3-5-7-10 colour scale. The first three millimetres are green, allowing the presence of periodontal pathology to be detected very quickly during the examination.

If the green scale is visible, the patient does not have pathology; if it is not visible, there are two white bands providing for quick and simple evaluation of the periodontal pocket.

When using Click Probe, the integrated “click” mechanism advises the operator when the pocket’s evaluation can be done. The blue probe has a 3-5-7-10 scale and the green probe has a 3-6-9-12 scale.

Additionally, these probes do not contain latex, which is another advantage for patients with hypersensitivity or allergy.

Removal of calculus or tartar

Removal of tartar or calculus is performed using an ultrasonic apparatus with different tips. This part of the treatment is perhaps the most stressful for special needs patients because it requires patience. Try to achieve effective aspiration to ensure that the patient does not feel overwhelmed by the presence of liquid in the mouth. Treatment may need to be provided over two or three clinical sessions, depending on the patient’s level of tolerance.

The sensation of a lack of air that patients can feel, along with the noise made by the ultrasound apparatus and dental sensitivity, makes this the most critical moment in the treatment. Administration of oral benzodiazepines as anxiolytics before starting the procedure can reduce the patient’s stress and make treatment easier. Local or infiltrated anaesthesia is also advisable for the most sensitive areas, such as the inferior incisors.

If the patient is anaesthetised, an anaesthetic should be used without vasoconstrictor in patients with arterial hypertension or diabetes, as well as in those with cardiopathies. When working with patients receiving prophylactic antibiotics, it is important to check that they have taken the antibiotic one hour before treatment.

If the patient requires removal of calculus in the periodontal pockets, carbon fibre-reinforced plastic curettes such as Perio Soft-Scaler or Implant Deplaquers (Fig. 4) can be used. These curettes can be sharpened using the same methods as for metal curettes, and can be autoclaved at 134°C.

Calcium in the pockets of the lateral surfaces of a tooth can be removed using an orofacial curette (Fig. 5), while a universal curette is used for the other surfaces (Fig. 6).

It is important to note that many patients receive anticoagulants and curettage can produce significant bleeding, so a check should be made that the patient has a prothrombin time index (INR) of 2.0-3.0 (72 h). If a patient presents with relatively significant bleeding at the end of treatment, rinsing with an ampoule of tranexamic acid 500 mg should be performed. Treatment should not be applied when INR is greater than 4. Values of 3.5-4 constitute a risk level requiring individual evaluation.
Removal of stains – polishing

The need for a chlorhexidine mouthwash to maintain control of periodontal disease, metabolic diseases and xerostomia, as well as the effects of tobacco consumption, tea, coffee, and other discolouring substances, in patients with special needs means that they often have externally stained teeth (Figs. 7, 8, 9, 10).

External staining is removed using a contra-angle reducer (3000 rpm) and preventive brushes or cups, along with polishing pastes.

The abrasive content of the prophylactic paste is important because this determines the paste’s index of abrasion, which is very significant in patients needing this treatment more often than the general population. The abrasive in Cleanic cleaning and polishing pastes is a natural volcanic stone (perlite, with a low index of abrasion of 27 in dentine and 3.4 in enamel) that is among the lowest on the market.

The availability of preventive pastes with different flavours and different excipients and compositions means that each can be chosen in accordance with the patient’s needs (Fig. 11): mint flavour; green apple flavour; berries flavour; fluoride-free preventive paste; paste for patients with sensitivity and allergies; and preventive paste for patients with implants.

Fluoride-free paste is indicated for patients requiring tooth cleaning prior to restorative treatment, as well as in patients with orthodontic appliances.

Greater numbers of patients are presenting with allergies or hypersensitivity problems related to specific products. Cleanic Light paste has no artificial colours or flavours, so is indicated in these cases. This paste is also very useful in patients with low tolerance to flavours and high nausea reflexes.

In addition, an increasing number of special needs patients are requiring dental implants. Any prosthesis needs to be cleaned to maintain oral health. A preventive paste indicated for patients with implants should be used in these cases (i.e. Hawe Implant Paste, which has a composition based on aluminium oxide that does not alter the implant surface or the prosthetic abutment because of its low index of abrasion, RDA 9.8 and REA 4.5. The maximum speed for this paste is 2000 rpm).

The brushes used for applying the paste can be different types and materials (Fig. 12). Natural bristle brushes (Fig. 12-1) or nylon bristle brushes (Fig. 12-2) can be used with polymer (Fig. 12-A) or metal (Fig. 12-B) cups. Brushes are single use and those with a polymer cup are guaranteed not to scratch the surfaces of the adjacent teeth during polishing.

Latex-free rubber Pro-Cups (Fig. 13-A) are single-use and have great value in these patients, allowing paste to be applied in an enveloping manner and providing good cleaning and polishing in the gingival zone because of their high flexibility. In addition, the laminar design avoids splatter, which makes them easier to use. There are two sizes – standard and junior – along with two levels of hardness – dark blue hard and light blue soft.

There is value in using rubber tips and brushes with different anatomical shapes (Figs. 13-B, 14, 15), as these reach all surfaces of the teeth, providing better cleaning of the dental surfaces and eliminating stains in the areas most difficult to access. These can
be attached directly to the contra-angle head or, even better, to the drill.

Figs. 16-A, B, C show the clinical application of Cleanic Berry Burst with a latex-free rubber cup for elimination of external staining and plaque bacteria from the vestibular aspect of the molars in the second quadrant.

Fig. 17-A shows the initial clinical situation of a patient undergoing hygiene treatment in a very delicate oral state. Fig. 17-B shows the application of the Cleanic Green Apple paste with a latex-free rubber cup. Fig. 17-C shows the final treatment result, with elimination of external staining.

Fig. 18 shows the application of Hawe Implant Paste with a brush around the crown-implant junction in the third quadrant (3.7).

Fig. 19-A shows the initial clinical situation of a patient with psychiatric problems. The arrow identifies external staining and the asterisk indicates hypoplastic lesions. Prophylaxis and application of Cleanic paste were followed by elimination of the external staining, leaving only the colour changes caused by the hypoplasias (Fig. 19-B).

Conclusions

Patients with special needs require frequent monitoring of the oral cavity because they are more susceptible to oral health problems than healthy individuals, resulting in changes in the stomatognathic equilibrium.

Dental prophylaxis and hygiene practices are among the most effective methods of monitoring caries and periodontal disease. As dental professionals, we must offer our patients the best treatments using all the products available to us, helping to monitor oral health.
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“Smart Placement” teknologia  Erinomainen juoksevuus
Säilyttää killon  Helppo kiillottaa


UUSI Cleanic Berry Burst

Profylaksiapasta

Cleanic profylaksiapastan patentoitu Perlite-teknologia puhdistaa ja kiillottaa yhdellä kertaa. Pastan hiomiskyky muuttuu työskentelyn aikana. Tämä mahdollistaa maksimaalisen puhdistettavuuden ja kiillottavuuden työskentelyn aikana. Käytät aikaa ainoastaan sen verran mitä pasta tarvitsee. Pasta saatavilla 100 g tuubissa. sisältää fluoria (0.10% NaF).

Seal-Tight Kertakäyttöinen ilma/vesi puustinkärki- 3 toimintoa

The INSIDE story...

Miltä sinun puustinkärkisi näyttää autoklavoinnin jälkeen? Seal-Tight kertakäyttökarjet auttavat sinua saavuttamaan tämän päivän hygienia vaatimukset vastaanottoilla.

Ole yhteydessä Kerrin edustajaan, jos et ole varma mikä adapteri sopii sinun 3-toimiseen puustiin.

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**HELSINKI**

Endo kurssi
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**JYVÄSKYLÄ**

Resto /Endo kurssi
29.10.2015
Aika: 17.00-21.00
Paikka: Sokos Hotel Aleksandra
Hannikaisenkatu 35
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Hammasväline Oy

Luennoitsijat:
EHL. Tapio Nurmi
(Endodontia, Kariologia)
EHL. Nina Mandelin
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