T he name of the game in dentistry to- day is to save the tooth for use in the future. In this age of adhesive dentistry, respecting and preserving the remaining healthy tooth structure as well as improving esthetics have become compo- nents of value as well. With today’s advanced technology and materials, longevity is mainly a matter of diagnosis, correct treatment plan- ning and proper execution of technique. The problem with replacing old amalgams with tooth-colored composites is that they are difficult, inconsistent and unpredictable. Yet, the warranty on these 30-, 40- and 50-year- old silver fillings is running out. We have to remember that amalgam technology is more than 150 years old. At that time, people lost their teeth a lot earlier and died a lot earli- er.

Now, however, we have a population that is over 50 years old and growing – and they want to keep their teeth feeling good and looking good. Patients are now living longer and they want and expect to keep their teeth for a lifetime.

Adhesive dentistry offers a more conservative restorative approach to conventional dentist- ry. Why take away healthy tooth structure when there’s a viable alternative? Why not attempt to save the good and just replace the bad? Direct composites and laboratory com- posite resin systems are valuable and worth- while options to preserve tooth structure and long-term dental health. After all, preserving a patient’s natural tooth, whenever possible, is always in his or her best interest.

It has been our experience that providing multiple, large interproximal posterior com- posites directly can be difficult to achieve on a consistent basis in the oral environment, es- pecially when replacing amalgams. Why? Be- cause they take a lot of chair time. Amalgams require bulk. That’s why we taught the block type preparation to provide the neces- sary bulk for strength.

Furthermore, because amalgams do not bond, we were taught to create undercutts and “ex- tension for prevention.” As mercury contracts and expands with cold and hot temperature changes over time, cracks form in the glass- like nature of teeth.

Most of the time, these large preps are diffi- cult to restore with direct composite. There are isolation and contamination issues, and it is difficult to replicate nature in the mouth in a timely, cost-effective and predictable man- ner for every case, every time. In addition, curing in layers makes for a long appoint- ment and increases the possibility of con- tamination. It is uncomfortable for patients to keep their mouths open for the prolonged amount of time necessary.

Often, large direct posterior composite resin yields unsatisfactory results in terms of esthet- ics, and especially long-term function, due to curing and contamination issues.

However, when we do same day inlay/on- lays out of the mouth and in the laboratory, we find that multiple posterior restorations are easier, stronger and more anatomical- ly correct. Because they are processed at the same time, they can be even more time effi- cient than using a CAD/CAM system and re- duce tooth movement during the transition- al phase that can result in altered contact or occlusion.

Not having to deal with provisional restora- tions absolutely eliminates those untimely emergencies when temporaries break or come off. Those costly, non-productive, uncomfort- able and unhappy second appointments can also be avoided, saving everyone time and money. In addition, without concerns about retention of temporaries, preparation can be even more conservative.

Case No.1

In this case, the patient came to our office on an emergency basis with a broken tooth on the upper right molar. It was no surprise that the tooth had a previously placed MO amalgam with recurrent decay that caused the meso- buccal cusp to fracture off completely (Figs. 1, 2). Often, teeth that have old amalgam fillings tend to break due to cracks caused by the expansion and contraction of the metal al- loy in the tooth’s glasslike substance.

In addition, caries detectors were non-exis- tent when the bulk of amalgam restorations were placed so many teeth have recurrent de- cay under the old amalgam fillings. After thorough clinical and radiographic ex- aminations were performed, it was deter- mined with the patient’s input that a same- day onlay would be the most prudent option for this tooth. This way, he would be receiv- ing the maximum amount of care in the least amount of time.

The procedure

After placing topical anesthesia, articaine HCl 4 percent with 1,000,000 epinephrine was ad- ministered to achieve profound anesthesia. Next, a nitrous oxide nasal mask was placed to decrease the patient’s exposure to mercur- ary aerosol while the amalgam was being re- moved. In this case, because the patient opted not to use nitrous oxide, pure oxygen was ad- ministered through the nasal mask.

We continued by isolating tooth #3 with a rubber dam. This step was essential to reduce the amount of amalgam ingested by the pa- tient. It also offers isolation, higher visibility and better dentistry for our patients. If doing quadrant dentistry, I like to use the split-dam technique, which stretches to include several adjacent teeth in a quadrant. A FenderWedge (Directa) was then placed to separate and protect the adjacent tooth during prep, air abra- sion, etching, bonding and refining while continuing to wedge the teeth for a tighter in- terproximal contact in the final restoration.

To make the removal of the remaining amal- gam restoration, a hourglass-shaped diam- mond bur was used as diamonds are less like- ly to produce the fracture and craze lines as- sociated with carbide burs. High-speed evac- uation was used throughout the procedure to help decrease possible ingestion and inhes- sion during amalgam removal.

Caries detector was painted onto the pre- pared surface, and it was noted that cracks associated with the long-time expansion and contraction of the mercury-filled amalgam restoration had contributed to the appar- ent interproximal decay. Once the decay was carefully and completely excavated using a small, round diamond bur and a spoon exca- vator, the tooth was insulated in a few import- ant steps (Fig. 3).

First, disinfectant was placed on the prepared dentinal surface (Hemaseal & Cide, Advan- tage Dental Products) and air-thinned. Then, two coats of self-etching bonding agent (Opti- Bond All-In-One Unidose, Kerr Dental) were placed to provide reduced postoperative sensi- tivity and high dentin bond strength.

After air thining and light curing, a flow- able composite (Premise Emax Forte, Expa- sys) in the lightest shade was added to the in- ternal walls and floor to create an even floor and to fill in undercutts that were originally prepared for amalgam retention. A flat-end cylinder, fine-grit, short Shank diamond was used to refine the tooth preparation after in- sulation was completed (Fig. 4).

Next, two Identic hydrocolloid alginate im- pressions (Dux Dental) were taken fast and accurately. They take only 90 seconds to set with our chosen materials, so they are ideal for same-day inlay/onlays. Before expressing the hydrocolloid material into the prepped tooth, we squirted a little surfactant (PrepWet Plus, Dux Dental) onto the tooth to wet the prep while my assistant mixed the alginate.

Meanwhile, a second assistant was loading a syringe with warm Identic Syringleable Hydro- colloid Carbiloids (Dux Dental) to hand to me. The “plug” was initially squirted away from the prep and then into the prep itself so as not to interfere with a “clean” impression. Once the tray had been loaded with the alginate (Identic, Dux Dental), the first assistant hand- ed it to me. The tray was inserted with gentle pressure and held steadily for 90 seconds. An- other impression was taken using the same aforementioned steps.

The patient then had about an hour break while the inlay was being made and was able to make the most efficient use of his time by having his teeth cleaned with the hygienist during this break in treatment. This not only made the most efficient use of the patient’s time, but it also eliminated “dead time” in our schedule.

The patient made the most of his time in the chair by brushing his broken tooth and getting his teeth cleaned. This combination of treat- ment lends itself to a more productive day when you work this way, and patients real- ly appreciate it.

Lab work

Meanwhile, back in the lab, the impres- sions were being cleaned and then poured with MACH-SLO (Parkell) and based with bite registration material on a C- lite articulator (Parkell) (Fig. 5). An electric waxing unit was used to block out any undercutts on the die (Ultra Water, Kerr Lab). The onlay was incrementally built in com- posite layers with a D2 primary dentin base shade (Premise Indirect Primary Dentin, Kerr Dental) followed by an A2 facial dentin shade (Premise Indirect Facial Dentin, Kerr Dental) and a neutral incisal shade (Premise Indirect Incisal, Kerr Dental). Once the onlay was cured with light, heat and pressure in the hot press (Parkell) for 10 minutes, it was fitted, adjust- ed and polished on the silicone models (Figs. 6, 7) with various burs and polishing wheels.

All margins, contours and contacts were accu- rately and accurately verified outside the mouth, saving valuable chair time and clinical frustra- tion.

Seating the onlay

When seating the onlay, a medium size Iso- lite (isolite Systems) was applied for easy iso- lation, suction was placed and the “plug” during the cementation of the onlay. No further anesthesia needed to be administered as the tooth had been lined with flowable composi- t e during the prep stage. Patients really ap- preciate this — especially because they are al- most back to “normal” by the time they leave.

The onlay was then tried to verify proper contacts, contours and margins. Before cementation, Exaplay (Kerr Dental) was
gently packed into the sulcus (Fig. 8). The aluminum chloride dried the tissue, reducing the risk of sulcal seepage and contamination. The FenderWedges were then inserted between the interproximal gingival floors where leakage is most likely to occur.

Occlusal flash and excess flowable composite were then “buffed” with a short flame carbide while the interproximal margins were adjusted with bulb or needle caries. Sometimes a Bard Parker #12 scalpel and Qwik Strip were then “buffed” with a short flame carbide while the interproximal margins were adjusted with bulb or needle caries. Polishing was further enhanced through the addition of polishing paste.

In just one appointment, an esthetic and conservative interproximal onlay replacing a mesiobuccal cusp was prepared, placed and polished (Figs. 10, 11).

Case No. 2

This patient also came in with a dental emergency. The filling had fallen out of his broken, lower right molar the day before he was given the estimate for three weeks on business. He wanted a “quick and permanent solution” (Fig. 12).

First the tooth was anesthetized. Next, a Fender Wedge was used to isolate the involved tooth, protect the adjacent interproximal surface and pre-wedge the tooth for optimal contacts (Fig. 13). The isolation was placed to obtain a dry and illuminated field. We used cavities detector to ensure complete decay removal (Fig. 14). The tooth was then microetched, etched and desensitized with HemaSeal and Cide (Advantage Dental Products). Two layers of selfetching bonding agent Bondit Adhesive (Kerr Unidose, Kerr Dental) were applied to provide reduced postoperative sensitivity and help maintain the height of the tooth. This was then air-dried and light-cured. Flowable composite (Premise Flowable, Kerr Dental) was added to the internal walls and floor, creating an even floor and filling in undulations that were originally prepared for caries removal and amalgam retention (Fig. 15).

After the tooth was insulated, the prep was refined with a #4 sonic cylinder, fine-grit short shank diamond. Two identical hydrocolloid impressions (Dux Dental) were then taken as before. These impressions were then sent to the assistant to be poured in the lab (Fig. 16). During the time between the onlay prep and seat, a small filling was done on another tooth to make the most of this appointment time slot while the onlay was being fabricated in the lab.

**Lab Work**

As described in Case No. 1, the assistant immediately poured the impressions in the lab with MACH-SLO (Parkell) after disinfecting them and basing them with a rigid, fast-setting bite registration material such as Blu-Mousse (Parkell) (Fig. 17). Within two minutes, we had a working silicone model on which to build the onlay (Fig. 18). The undercuts were then blocked out with an electric water (Ultra Water, Kerr Lab), paying special attention to avoid the margins (Fig. 19).

Starting with the Premise Indirect (Kerr Dental) dentinal shades (A2 primary dentin and A1 facial dentin) and ending with incisal and facial central incisal), the model was incrementally fabricated in layers using various composite instruments. The onlay was then placed in the BellaGlass curing oven for heat, pressure and light curing.

In approximately 10 minutes, the onlay was ready to be finished with multiple finishing burs (Fig. 20) on the silicone model. The onlay was polished for a high shine and then checked on the model to verify accurate interproximal contacts and margins (Fig. 21).

**Seating the onlay**

When seating the onlay, the Isolite was re-applied for isolation, ease of placement and the patient’s comfort during the cementation stage. Before cementation, Expasyl (Kerr Dental) was gently packed into the sulcus, creating a dry space between the tooth and tissue without any risk of rupturing the epithelial attachment (Fig. 22). The aluminum chloride in the Expasyl dried the tissue, reducing the risk of sulcal seepage and contamination.

The FenderMate was then inserted beneath the interproximal floor to slightly separate and isolate the adjacent teeth and to help facilitate seating the onlay. After rinsing the Expasyl prior to seat.

The restoration was cured from all angles, starting at the interproximal gingival floors where leakage is most likely to occur. Occlusal flash and excess flowable composite was “buffed” with a short flame carbide while the interproximal margins were adjusted with bulb or needle caries. A Bard Parker #12 scalpel and Qwik Strip (Axis) were used to remove interproximal cement and facilitate the cement removal step after the restoration was cured.

The restoration was cured from all angles, starting at the interproximal gingival floors where leakage is most likely to occur. Occlusal flash and excess flowable composite was “buffed” with a short flame carbide while the interproximal margins were adjusted with bulb or needle caries. A Bard Parker #12 scalpel and Qwik Strip (Axis) were used to remove interproximal cement and then the remaining floss was used to floss out any remaining cement and to ensure proper at-home flossing.

Once the ideal occlusion was established, diamond-impregnated points and/or cups were used to polish the restoration, starting with the coarse grit first and finishing with the finest for a smooth finish while a FDQ composite polishing brush (Axis Dental) with composite polishing paste (Enamelize, Cosmedent) made for a final high shine.

**Conclusion**

There are certainly clear advantages for both the patient and the dentist when doing indirect composite resin restorations. These restorations have helped us save patients’ teeth, time and money. Over the last 20 years, we have been modified and modified these restorations in terms of techniques, materials and equipment. These restorations not only save time and conserve healthy tooth structure, they are a valuable service to provide to our patients; and they appreciate it.

Direct composites are an essential part of our armamentarium. Nevertheless, indirect composite restorations have many advantages, especially when dealing with multiple restorations involving adjacent interproximal surfaces. Direct composites simply make no comparison between the strength of these materials made outside of the mouth with those cured in the mouth.

It is much easier to build, control, polish and finish the occlusal, interproximal and facial lingual morphology in the laboratory. Patients appreciate the numerous benefits of both direct and indirect composites, and they especially appreciate not having to be in cumber some temporaries or having an inconvenient second appointment.

Perhaps the greatest advantage for the patient is being able to conserve the maximum amount of healthy structure while saving time and money at the same time. The trend in dentistry today is clearly toward more esthetic and less invasive. Indirect resin and ceramic inlays and onlays are not only compatible with this trend, but fully meet the expectations of both the patient and the dentist.