Treatment of Occlusal Load-Bearing Posterior Cavities

Juergen Manhart, Germany

Introduction

Direct composite restorations together with acid etch technique have been used in anterior for several decades and for more than 20 years in the masticatory-load-bearing posterior region as an aesthetic alternative to metal restorations. The results of early posterior composite restorations were not encouraging, mainly due to their inadequate mechanical properties, including low abrasion resistance, early fractures and marginal leakages consequen-
tial to polymerization shrinkage. However, recent material development has eliminated these shortcomings considerably. The effects of shrinkage can further be minimized by the synergistic combination of minimally invasive cavity preparations, effective adhesives, low-shrinkage composites, new light-curing techniques (eg, soft-start or pulse-delay), and the incremental layering technique.

Case History

The following case demonstrates the replacement of an upper posterior composite restoration with Ceram•X MONO nano-ceramic restorative material. The chief complaint of the 20-year-old female patient was dental floss always catching and fraying on the mesial and distal margin of the composite restoration on tooth 16 (Fig. 1). During a clinical examination, a marginal gap was detected in the proximal box. The patient agreed to have it replaced with Ceram•X nano-ceramic restorative material.

Ceram•X MONO, available in seven shades of intermediate translucency, is a universal composite and does not have separate dentin and enamel materials. The cavity can completely be restored with one shade using simple incremental layering technique.

The tooth was first thoroughly cleaned of external debris using Nupro fluoride-free prophylaxis paste (Dentsply) on a rubber polisher (Fig. 2). The shade (A2) was taken in natural daylight with the Vitapan Classic shade guide under moist condition (Fig. 3) and before placement of rubber dam to avoid incorrect determination due to dehydration and strong contrast of the surroundings.

After removal of the old restoration, a bit of Ceram•X MONO M2 (corresponding to Vita shade A2) material was applied to the tooth and light cured to verify the shade. This was easily removed with a hand instrument as the tooth had not been pretreated with adhesive (Fig. 4).

Rubber dam was placed to ensure that the working area is free of contaminants that could greatly reduce the adhesion of the composite which in turn will have detrimental effect on the marginal integrity. A precontoured Palodent® sectional metal matrix was placed to confine the proximal box and secured with a BiTine ring (Dentsply) that additionally could separate teeth to compensate for the thickness of the matrix (Fig. 5).

Xeno® III (Dentsply) was selected as a bonding agent, its self-etching effect (pH < 1) activated by the mixing of the two adhesive components A & B. This was applied to the entire cavity using a mini-brush (Fig. 6). After 20 seconds, the solvent (water/ethanol) was evaporated with oil-free compressed air.

It was then light-cured for 10 seconds, producing a shiny surface over the entire cavity. The adhesive should be reapplied to any dull areas. Otherwise, the bond might be affected and postoperative hypersensitivity could arise.

The mesial wall was first adapted carefully against the matrix and built up to the marginal ridge with Ceram•X MONO (Fig. 7). After anatomically contouring the marginal ridge area, it was polymerized for 20 seconds (intensity > 500 mW/cm²). The matrix was then removed (Fig. 8), effectively transforming the original Class II into a Class I cavity.

The center of the cavity was then filled and light-cured with Ceram•X MONO in 2 mm-increments, followed by the mesiopalatal, mesiobuccal and distobuccal cusps. The occlusal surface was given a final polymerization cycle. The correct shaping of occlusal anatomy and excess removal while the composite is still pliable greatly facilitates finishing (Fig. 9).

Rubber dam was removed. The restoration might be too dark (as compared to surrounding tooth structures) due to dehydration of the tooth; therefore rehydration was required prior to final evaluation of the shade of the new restoration. The pits and fissures were accentuated with a small, pear-shaped finishing diamond (Fig. 10) while the convexity of the triangular ridge and the smooth transition of various occlusal anatomies were prepared with a point-shaped finishing diamond (Fig. 11). Any remaining roughness was then light-cured for 5 seconds and polished with oil-free compressed air.
was removed with a white stone, which was also used to optimize the cavosurfaces (Fig. 12). Polishing with Pfo® (Dentsply), an elastic, diamond-impregnated polisher (Fig. 15), produced an excellent luster restoration surface. After checking for premature contacts with articulating paper, a final high-luster polish was achieved using Prisma® (Gloss® Fine & extra-fine (Dentsply) composite polishing pastes on mandreled foam-cups (Fig. 14).

Figure 15 shows the functional, aesthetic tooth restoration at the recall appointment after a week.

Conclusion
Direct composite restorations in conjunction with minimal inva- sive cavity preparations will continue to increase in importance in the future. The basic requirements for ensuring a high-quality composite restoration with excel lent marginal adaptation are still an accurate matrix technique, an effective dentin adhesive, a microlayering technique, and adequate polymerization of the composite.

Asian Student Has Won Global Ceram•X™ Case Contest

We are pleased to announce Ms. Patcha Angsuchotmetee of Chiang Mai University was awarded first prize in the DeTrey Global Ceram•X Case Contest. We should all be very proud of this achievement in Asia and would like to send our hearty congratulations to Dr. Asia and would like to send our hearty congratulations to Dr. Manhart and his student Ms. Patcha Angsuchotmetee.

In the ever-advancing development of better dentistry, new products are being introduced almost everyday. Seldom, however, do we come across a product that has so many dentists (and “would-be” dentists) talking. This new material is Dentsply’s Ceram•X nano ceramic restorative.

A perfect synergy of simplicity, beauty and strength, Ceram•X provides an easy approach to the practice of aesthetic dentistry as well as general restorative dentistry. To seek such consensus within the dental profession, a case competition was recently organized by Dentsply Asia in the most prestigious dental colleges across the region. A total of 42 universities from 11 locations (China, Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand and Vietnam) participated in this student-only competition.

In this competition, universities were provided with assortment of single-opacity Mono and double-opacity Duo materials together with all the accessory materials (such as etching, bonding, and polishing) from the complete line of restoratives from Dentsply. Students, under the supervision of their professors, were then given a free hand to select their cases, utilizing either versions of the composites.

Each clinical procedure, complete with photos and detailed write-ups, was properly documented. These were then compiled very professionally prior to submission. From incisal fractures to diastema closures, from discolored restorations to amalgam replacements, from veneers to inlays, this competition completely explores and exemplifies the wide indications of an excellent composite material.

The response was so overwhelming and the cases submitted were of such high standard that it took the panel of judges several days of heated debate to decide on the winners. After careful consideration, a total of four Asia awards (two each for the Mono and Duo Competitions) were announced.

In the Mono category, the first prize went to Rohami Mahmod of the University of Malaya, Malaysia and the second prize to Prashant S. of JSS Dental College & Hospital, India. Patcha Angsuchotmetee of Chiang Mai University, Thailand and Loke Weiqing of the National University of Singapore earned the top two honors.

Aside from fabulous prizes in each category, these students also competed with their European contemporaries in the DeTrey Global Ceram•X Case Contest where our Asia winners have won one Europe award each. The event proved to be an exciting experience for the participants, as well as an optical treat for everyone present. Numerous media personnel were on hand to document the event.

The following is a collage of cases from the various winners of this competition. More documentation can be found on www.dentsply-asia.com.

Author Info

Dr. Juergen Manhart, is currently Associate Professor in the Department of Restorative Dentistry at the Dental School of the Ludwig-Maximilians-University (LMU) in Munich, Germany, where he received his doctorate (D.M.D.), Dr. med. dent. (PhD), and Prof. Dr. He completed graduate/postgraduate research program as an Adjunct Assistant Professor in the Biomaterials Research Center, Department of Basic Sciences, University of Texas, Houston, USA. He serves as a reviewer for several dental journals and is a member of the German Institute for Standardization, Committee on Restorative Dental Materials and several other national and international scientific dental associations. In addition to his teaching and research responsibilities, Dr. Manhart is engaged in clinical dentistry in an intramural practice facility, focusing on general and aesthetic dentistry. He has authored several book chapters and numerous research articles in national and international dental journals, focusing on clinical studies and in vitro testing of dental materials. He has given numerous lectures, continuing education courses, and hands-on courses on aesthetic dentistry in Germany, Austria, China, Taiwan, South Korea, Bulgaria, Liechtenstein, France, Italy, United States of America, United Kingdom, Canada, and Russia. Dr. Manhart may be contacted at:

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The 2005 DeTrey Global Ceram•X Case Contest

Presented by Loke Weiqing, Singapore
Presented by Prashant S., India
Presented by Patcha Angsuchotmetee, Thailand
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