



**Dr. Pierre Dimitrov** graduated from the Medical University of Sofia (Bulgaria), Faculty of Dental Medicine in 2016. He is working in the dental clinic DentaConsult in Sofia. His interests are in restorative dentistry of posterior teeth, endodontics, digital dentistry and dental technology. Dr. Dimitrov has attended postgraduate courses in the fields of e.g. composite restorations, indirect ceramic restorations, endodontic treatment and digital workflow in restorative dentistry.



**Dr Assen Marinov** graduated from the Medical University of Sofia (Bulgaria), Faculty of Dental Medicine. He is practicing in the fields of dental implantology, functional and aesthetic dentistry. Dr. Marinov has finished the Basic Curriculum at the Vienna Interdisciplinary School of Dentistry (VieSID) (Austria), implementing the protocol of Prof. Rudolf Slavicek in his practice. He also finished the complete course in functional diagnostic wax-up of DTG Stephan Provancher and attended the Master Program in digital and aesthetic dentistry with Paulo Kano." Together with the team of DentaConsult, Dr. Marinov is developing a growing practice in Sofia. He is combining digital and analogue workflow in treatment planning and execution.



**MDT Boyanka Vladimirova** became a dental technician in 1994. She got her training and Dental Council's registration at the Medical Collage in Varna (Bulgaria). She is a member of the Dental Technologists Association (DTA). She has been working at various laboratories and owns her own company since the beginning of 2018. She is also a ceramist at the team of DentaConsult. Her focus is on aesthetic crowns and bridges, with a strong attention to design, detail and quality.

# Indirect Hybrid Nano-Ceramic Adhesive Restorations in the Posterior Region

A case report using the new CERASMART270

By **Dr. Pierre Dimitrov, Dr. Assen Marinov and MDT Boyanka Vladimirova, Bulgaria**

Indirect composite and ceramic restorations are a valid solution in restoring medium to heavily damaged teeth in the posterior region, providing strength, longevity and aesthetics. With the advancement of CAD/CAM technologies and intraoral scanners we can produce and deliver these kinds of restorations in one visit or a few days, minimising the chance of sensitivity, maintaining tooth vitality and protecting the damaged tooth structures from cracks and fractures. Using contemporary adhesive systems and composite materials we are able to bond indirect restorations with little to no retention in the preparation, without unnecessary sacrifice of tooth structures and still be able to guarantee a predictable long term success to our patients.

## Indirect Hybrid Nano-Ceramic Adhesive Restorations in the Posterior Region



**Fig.1:** CERASMART270 overlay, milled with Sirona Cerec 4.

The new CERASMART270 is a great addition to GC's growing CAD/CAM solutions providing increased strength while keeping everything great about the original CERASMART blocks - flexibility, possibility of abrasion and repairability at a reasonable price (Fig. 1). Our preparation, production and luting procedures remain basically the same without the need to change or adapt our clinical and laboratory protocols. The CERASMART270 blocks are a perfect choice for in-office milled indirect restorations as the finishing, staining and glazing steps can be easily carried out in the dental office using GC OPTIGLAZE and OPTIGLAZE color.

I would like to share a case from our daily practice, restoring three posterior teeth in a quadrant where CERASMART270 blocks in two translucencies were used - A3 HT for the molars and A3 LT for the endodontically treated, darker shaded



**Fig.2:** Preoperative photograph, occlusal view.

premolar. A mixed analog-digital workflow was used for this case. The treatment was completed in two visits in the span of 3 days. Each step from the preoperative situation until the finishing, including the laboratory phase will be shortly explained.

The patient initially presented with a few direct restorations in the left lower jaw (3rd quadrant) (Fig. 2). Complaints of the patient were increased sensitivity to thermal stimuli in this region and food impaction. The second premolar was endodontically treated and without radiologic or symptomatic signs of apical periodontitis; the buccal and lingual walls and the mesial marginal ridge were thin and undermined; the shade of the tooth was visibly different. The first molar was vital with a big direct composite restoration of the mesial, occlusal and distal surfaces with residual caries on the distal; the buccal and lingual wall were thin and suspected to crack or fracture at any time. The second molar was vital with a faulty direct restoration, showing degradation of the bond between restorative material and tooth, uncovered dentine, suboptimal proximal contacts and thin buccal and lingual walls. The soft tissues were inflamed. The decided treatment plan with consent of the patient was to restore the second

premolar and two molars with full coverage CERASMART270 overlays in 2 visits - one for preparation and impressions and another one for bonding the restorations.

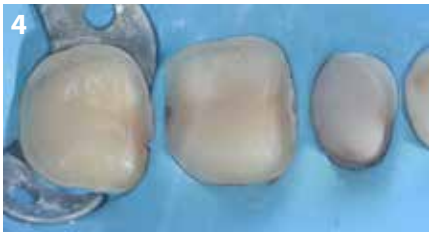
After isolation with rubber dam, the old restorations and underlying caries were removed with a round diamond bur on high speed with plenty of water cooling, followed by final cleaning of the decayed dentine with a steel manual excavator and gentle sandblasting with 27 micron aluminum oxide particles. A small portion of the mesiolingual pulp horn was exposed. The undermined and unsupported cusps and walls were reduced to ensure stable dentinal support of the tooth structures and provide restorative material space of 1.5 - 2mm. A buccal chamfer preparation was chosen for the second premolar out of aesthetic considerations. (Fig. 3)

An immediate dentine sealing procedure was carried out to ensure optimal adhesion to the freshly prepared dentine and to create a hermetically sealed biological system, protecting the tooth structures from contamination. A deep margin elevation was performed for the distal margin of the second premolar. Enamel margins were left uncovered to be available as an adhesion substrate in the cementation



**Fig. 3:** Intraoperative view - restoration and caries removal, cusp reduction.

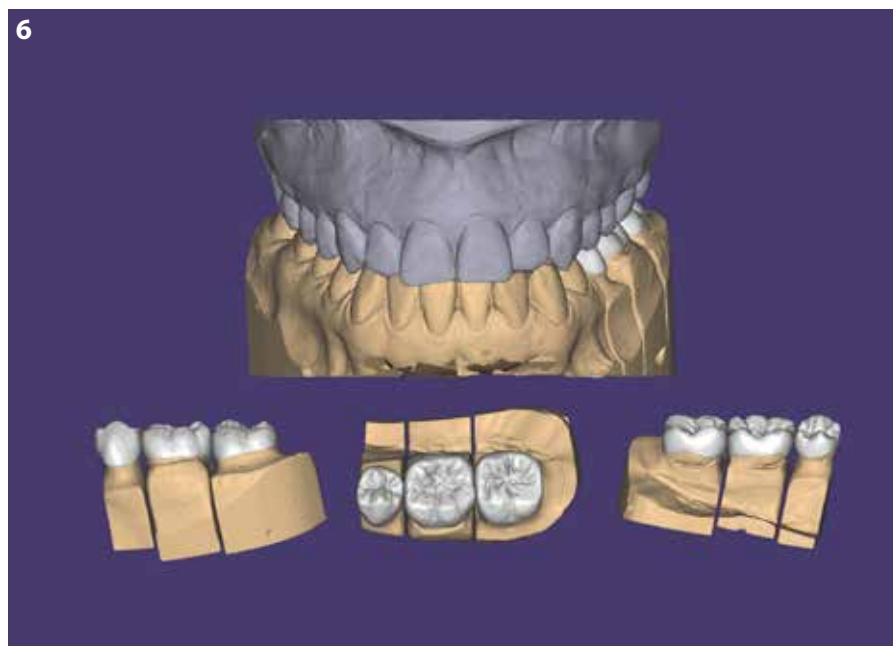
## Indirect Hybrid Nano-Ceramic Adhesive Restorations in the Posterior Region



**Fig. 4:** Immediate dentine sealing and deep margin elevation.



**Fig. 5:** Stone models mounted in the articulator.



**Fig. 6:** Digital design of the restorations.

step. The pulp exposure was only sealed using adhesive and flowable composite.

The tooth structures were gently sandblasted for 10-15 seconds with 27 micron aluminum oxide particles under pressure with plenty of water cooling. Dentine was then etched with 37% phosphoric acid for 15 seconds and generously rinsed afterwards, followed by gentle drying of the dentinal structure with a 3-in-1 syringe to prevent desiccation of the tooth structures. With a microbrush, a coating

of G-Premio BOND was applied and rubbed for 20 seconds onto the dentine. After thinning of the adhesive with air it was cured for 20 seconds using the High Power Mode of D-Light Pro. A layer of G-ænial Universal Injectable, shade A2, was applied over the dentine, sealing it and removing all uneven surfaces and undercuts of the preparation. With a diamond bur the enamel margins were prepared once again to ensure to adhesive or composite has been left. Preparation and marginal finishing were done after the removal of the rubber dam. (Fig 4)

A one-step VPS impression of the lower jaw, an alginate impression of the upper jaw, a bite registration and a face bow were transferred from the patient to the laboratory. In the lab, stone models were fabricated from GC FujiRock. The models of the jaws were mounted in a semi-adjustable articulator using average settings using the bite registration and the face bow. The preparation model was cut into separate stone dies for optimal scanning and access to the margins. A check model of the prepared teeth was also poured from GC FujiRock. (Fig. 5)

The models and the separate preparation dies were scanned using Medit Identica T500 laboratory scanner. The restorations were then designed in ExoCAD according to the static occlusion and the dynamic relationship of the teeth in protrusion and lateral movements using the virtual articulator function. (Fig. 6)

The restorations were milled from CERASMART270 with a Roland DWX-4W milling machine using a milling strategy for hybrid ceramics. The second premolar restoration was milled from CERASMART270 A2 LT and the two molars were milled from CERASMART270 A2 HT. (Fig. 7)



**Fig. 7:** Milled restorations straight from the milling machine.

## Indirect Hybrid Nano-Ceramic Adhesive Restorations in the Posterior Region

The restorations were cut from the sprues, finished with a rubber point, sandblasted with 27 micron aluminum oxide and cleaned with a steam cleaner. A coating of CERAMIC PRIMER II was applied and was set to dry. Characterization was done using OPTIGLAZE color and OPTIGLAZE Clear. Each layer of the stains was polymerised for 20 seconds using D-Light Pro in High Power Mode. The restorations were finally polished with diamond paste and a goat-hair brush. (Fig. 8)

On the day of the cementation, the restorations' inner surfaces were sandblasted with 27 micron aluminum oxide particles and subsequently cleaned using phosphoric acid for 30 seconds. With a microbrush, a coating of CERAMIC PRIMER II was applied to the clean surface and let to evaporate. G-aenial Universal Injectable A2 was used as the cementing composite. It was applied right before the cementation (Fig. 9).

The preparations were isolated with a rubber dam and were sandblasted with 27 micron aluminum oxide particles under pressure with plenty of water cooling in order to achieve a clean and rough surface, ensuring



**Fig. 8:** The finished restorations on the check model.



**Fig. 9:** Inner surface treatment before adhesive cementation of the restorations.

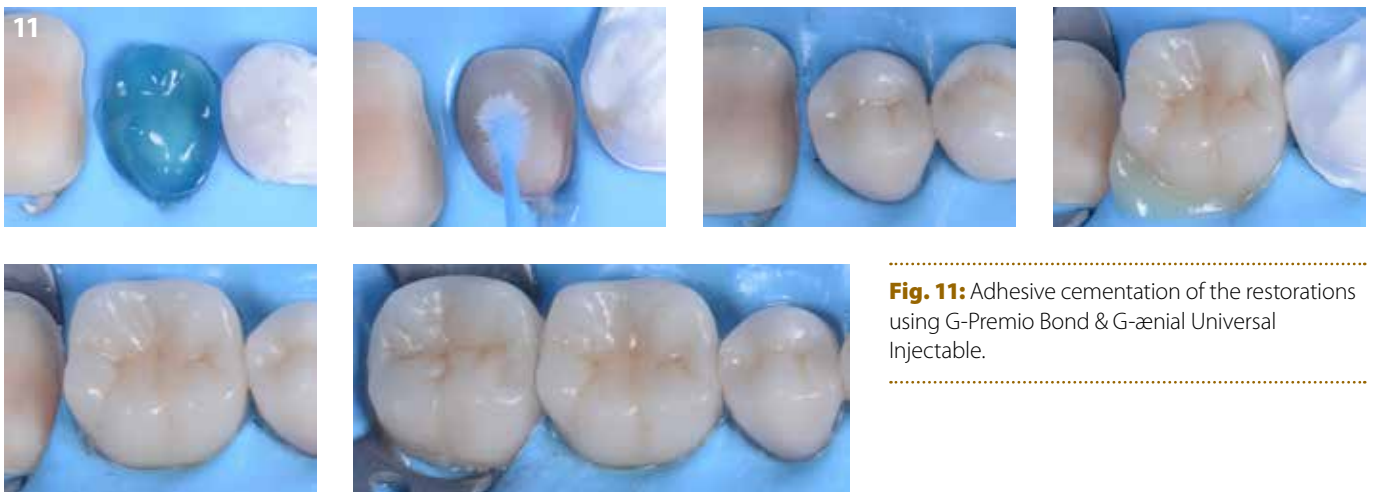
optimal adhesion between the restorations and the teeth. (Fig. 10)

The cementation of the restorations was carried out one by one for each tooth following the same protocol for

treating the tooth surface. Enamel and composite were etched with 37% phosphoric acid for 30 seconds, followed by generous rinsing with water. The preparation surface was air dried with air. G-Premio BOND was



**Fig. 10:** Isolated and sandblasted preparations, prepared for adhesive cementation.



applied to the preparation surfaces in accordance with the manufacturer's instructions. The restoration was put and held in place by hand. All composite excess was removed using a probe and a brush until visual control of the sealed preparation's margins

was achieved. Everything was polymerised after complete cleaning on each surface of the tooth (buccal, lingual and occlusal) for 20 seconds on each surface with D-Light Pro in High Power Mode. (Fig. 11)



## Indirect Hybrid Nano-Ceramic Adhesive Restorations in the Posterior Region

Finishing and polishing of the margins of the restorations was done using abrasive metal and polishing plastic strips, rubber points and a polishing brush with diamond paste. Using the Detection Mode of GC's D-Light Pro we were able to inspect the margins of the restoration and tooth structures for excess cement. A good overall integrity of the tooth-restoration complex was achieved. (Fig. 12)

A bitewing radiograph of the cemented overlays was taken in order to assure proper restoration adaptation and visualise composite excess. The small excess of composite viewed at the distal margin of the second molar was removed subsequently and the margin was polished using rubber points and polishing brush. (Fig. 13) A checkup of the restorations 2 months after cementation showed good aesthetic and functional integration. The patient was comfortable and satisfied with the treatment. No complains of sensitivity, food impaction or any discomfort have been reported. The restorations displayed a pleasant aesthetic integration, including the second premolar which had a significantly darker shade before the treatment. (Fig. 14)

In conclusion, the new CERASMART270 is a great addition to GC's CAD/CAM solutions. Compared to its original predecessor, it offers increased strength, while maintaining flexibility, simplified laboratory steps and maintaining the same clinical protocols in preparation and cementation procedures. Thanks to the great line and wide selection of GC's restorative materials - flexible and

simplified adhesive systems, different kinds of clinical and laboratory composite materials, highly aesthetic and durable ceramics and other equipment, we are confident to offer our patients a long term solution and provide them with functional and aesthetic restorations with a minimised risk of procedural mistakes and complications.



**Fig. 13:** Bitewing radiograph after cementation of the CERASMART270 restorations



**Fig. 14:** Two months recall of the cemented CERASMART270 restorations.