NEW UPDATES IN PRIMER APPLICATION IN ADHESIVE AND RESTORATIVE DENTISTRY

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INTRO

In the field of adhesive and restorative dentistry, surface cleaning and accurate application of adhesives and primers are crucial for the longevity and effectiveness of restorations. Traditionally, disposable dental applicators made of synthetic fibers are used for this purpose, which can sometimes cause dispersion or surface contamination due to accidental loss of filaments; especially for the application of silanes, primers or adhesives whose composition can alter the physical-chemical properties of the synthetic fibers.

ZerofloX™ micro applicator (medmix Switzerland AG) has recently been introduced as an innovative micro applicator that replaces traditional fiber flocking with thermoplastic elastomer (TPE) bristles. The introduction of ZerofloX arises from the growing clinical need to optimize the operational steps for the treatment of dental surfaces and restorations, especially when working with materials such as zirconia, lithium disilicate and other glass-ceramics. In this context, even minimal impurities or irregularities in the distribution of the primer and adhesive systems can compromise the adhesive efficacy and negatively impact the duration and performance of the restoration.

This evaluation therefore aims to analyze, through a microscopic investigation, the effectiveness of the application of two different primers (Primer A and B) applied onto zirconia and lithium disilicate samples, using a conventional micro applicator with fiber flocking and the new ZerofloX micro applicator. The objective is to evaluate the surfaces at high magnification after the application of the primer using two different applicators and compare the homogeneity and quality of the distribution of the material applied and absence of residues.

The observations obtained will allow us to highlight the differences between the two application systems with regards to the management of the adhesive procedures for different materials.

Fig. 1 Conventional micro applicator with fiber flocking

CONVENTIONAL MICRO APPLICATOR WITH FIBER-FLOCKING

Disposable micro applicators typically consist of a thin and flexible plastic handle with a head made of synthetic fiber flocking. Its application method is simple: after having coated the tip of the applicator with the primer or adhesive, the material is transferred onto the surface to be treated with small gentle motions. However, the use of this type of applicator has some significant clinical disadvantages, such as the potential loss of fiber flocking that can contaminate the operating field. Furthermore, the fibrous flock tends to absorb a non-uniform quantity of material, increasing the risk of waste and non-uniform distribution onto the tooth surface or prosthetic device.

ZerofloX™ MICRO APPLICATOR

ZerofloX stands out as the next generation micro applicator specifically designed to meet the most modern clinical needs in restorative and prosthetic dentistry. Its most innovative feature is the absence of fiber flocking: the applicator head is made of thermoplastic elastomer (TPE) material that guarantees precise and contamination-free material application; thus eliminating the risk of surface contamination from residual fiber flocking which is typically observed when using traditional fiber-flocked micro applicators. The TPE bristles also offer excellent flexibility, allowing the head to deform slightly to adapt to the different morphologies of dental and prosthetic surfaces eliminating the need for applicators with different sizes. This translates into a fewer number of instruments required for greater operational efficiency. Furthermore, the controlled deformability of the bristles reduces the risk of excessive pressure on the material applied, favoring a more delicate and uniform deposition; an aspect particularly relevant for adhesives and silanes that require a thin and well-distributed application layer. Additionally, the bristles do not absorb excess material to avoid waste and ensure that an sufficient amount of adhesive, primer or silane is released in a uniform and controlled manner onto the surface to be treated. ZerofloX is also equipped with two bending points on the handle, which significantly improve the ergonomics of this micro applicator.

Fig. 2 ZerofloX™ micro applicator with elastomer bristles

COMPARATIVE ANALYSIS

This evaluation analyzed lithium disilicate and zirconia samples, which were both conditioned with two types of primers (A and B) and analyzed under microscopic analysis immediately after application. Significant differences were observed under direct comparison between the fiber-flocked micro applicator and ZerofloX™. At the operational level, the absence of lost fiber flocking and use of thermoplastic elastomer bristles for ZerofloX ensure for a more precise and uniform distribution of the materal compared to the fiber-flocked micro applicator which disperse lost fiber-flocking creating undesired surface contamination.
The following images show the difference in surface homogeneity and the presence of fiber-flocking on zirconia samples (Fig. 3, Fig. 4, Fig. 5 and Fig. 6)

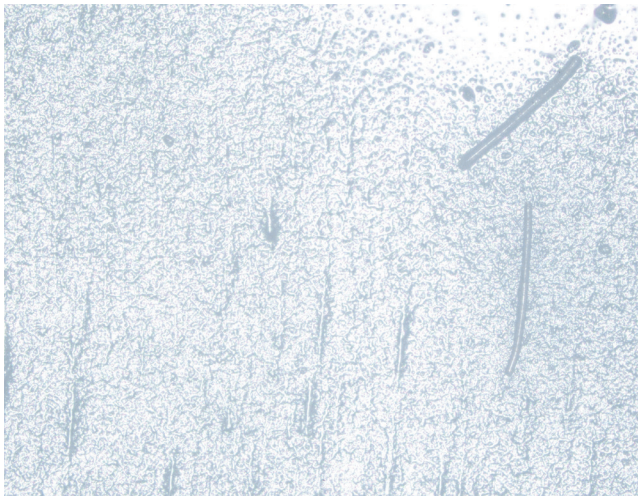

Fig. 3 Zirconia sample treated with conventional fiber-flocked micro applicator (Primer B)

Fig. 4 Zirconia sample treated with ZerofloX micro applicator (Primer B)

Fig. 5 Zirconia sample treated with conventional fiber-flocked micro applicator (Primer A)

Fig. 6 Zirconia sample treated with ZerofloX micro applicator (Primer A)

Clinically, the improved uniformity in distribution and absence of surface contamination could ensure better distribution of the binders on the internal surfaces of the restoration, optimizing the adhesive procedures. ZerofloX is particularly recommended for procedures that require maximum precision, such as: aesthetic adhesive restorations, application on ceramic surfaces, or cleaning ceramic surfaces before applying primers. In fact, cleaning with alcohol-based substances combined with scrubbing them onto the surface may cause the risk of having significant fiber residues, if performed using a conventional fiber-flocked micro applicator. The use of ZerofloX eliminates this problem by optimizing cleaning of the restoration as well as subsequent application of the primer.

SUMMARY

CONCLUSIONS AND RECOMMENDATIONS

This evaluation positions ZerofloX™ as a significant improvement over conventional fiber-flocked micro applicators for the placement of primers or adhesives on lithium disilicate or zirconia ceramic restorations due to its elimination of lost fiber-flock contamination as well as a more precise and efficient distribution of the material.

Key benefits include reduced material waste, lower risk of surface contamination, and uniform application of the primer - all factors that may be important regarding the longevity and clinical efficacy of restorations.

From a clinical perspective, ZerofloX micro applicator offers tangible advantages in terms of precision application, protocol safety, and optimization, which may be particularly useful in the most delicate adhesive procedures or in the pre-application cleaning phases of zirconia and lithium disilicate restorations.

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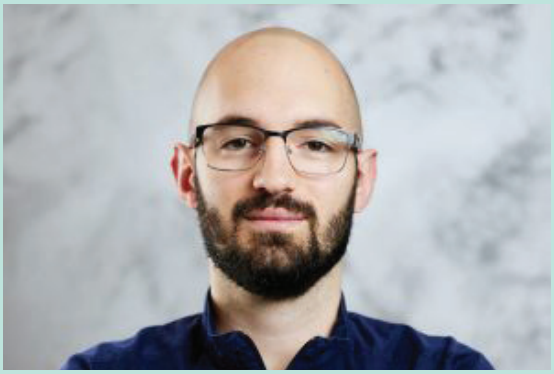
THE AUTHORS:

Dr. Giacomo Fabbri graduated with honors in dentistry and dental prosthodontics from the **University of Pavia**. He is an active member of the **Italian Academy of Prosthetic Dentistry** (A.I.O.P), a prestigious scientific academy in the field of esthetic and prosthetic dentistry.

He has published several articles in international peer-reviewed journals and lectured in Italy and internationally on topics related to fixed prosthodontics and implant prosthodontics with specific interest on esthetics, new materials and minimally invasive treatment.

Dr. Fabbri's clinical practice Ban Mancini Fabbri Specialist Dental Practice, is located in Cattolica, Italy, with expertise in the field of esthetics and prosthetic rehabilitation on natural teeth and implants.



Dr. Luca Carloni is a dental surgeon and founder of **Centro Odontoiatrico Carloni**, a private dental clinic located in Urbino, Italy. He graduated in dentistry from the **University of Ancona**, where he developed a strong foundation in clinical and restorative dental sciences.

Dr. Carloni is committed to delivering high-quality, patient-centered care, with a focus on modern techniques and technologies in general and cosmetic dentistry. His clinical interests include preventive care, prosthetic rehabilitation, and minimally invasive treatments aimed at preserving natural dentition and enhancing esthetics.