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RESEARCH ARTICLE OPEN ACCESS

IMMERSIVE EXTENDED REALITY GUIDE TO DIRECT VENEER IN COMPOSITE RESIN AND MAKEUP

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ABSTRACT

Extended reality technology assists the professional with planning, design, guides and navigation of procedures. This study demonstrates the direct veneer technique in composite resin layered and made up on element 11, guided virtually by the Bio immersive reality platform, which provided navigation and interaction of the procedure via the link received by WhatsApp or e-mail, the entire process is virtual, contributing to biosafety and the professional does not need a physical guide and specific skills. This method guided by realities adds new possibilities for education and clinical practice, impacting the excellence of clinical procedures, benefiting patients and professionals.

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SHORT COMMUCATION

Minimally invasive procedures with maximum preservation of the dental structure for cases that require changes in the dental anatomy and color changes are desired procedures in restorative dentistry and require work protocols aimed at excellence, combining aesthetics and smile rehabilitation (D'Onofre *et al*., 2020; Ottoboni *et al*., 2020) In restorative dentistry, planning can be digital, optimizing the clinical procedure, making it easier and more predictable, we have some types of guided restorations in silicones and 3D printed resin (Ottoboni *et al*., 2020; Mariotto *et al*., 2020). In 1997 augmented and virtual reality were described, reporting real-time interactivity with the displayed images, and in 2001 the combination of real and virtual objects in the real environment. (Azuma, 1997; Azuma *et al*., 2001) The technology of realities unites the virtual world developed using high technology with the real world. In 2013, a human – technology – machine interface has been reported, which simulates a real environment with immersion and interactivity based on 3D images generated by softwares (Scalco *et al*., 2013). The development of technologies for guided interventions in digital dentistry, collaborate with the reduction of risks and increase the accuracy, predictability and success of procedures (Ottoboni *et al*., 2020). The technology of realities aims at the interaction of the virtual world with the real world.

The use of augmented reality technology can effectively improve the visualization of teeth, reduce preparation errors, reduce operative time and repetitive operations (Jiang *et al*., 2022). In the virtual environment, the user points, manipulates and performs actions on virtual objects, in real time. (Kirner *et al*., 2006) Information technology has brought diagnostic, planning and training possibilities to the virtual plane to dentistry, where exams inserted in software recreate the "real patient" in the virtual plane, increasing the practicality, predictability and assertiveness of procedures for oral rehabilitation.

This study demonstrates the application of extended reality in dental practice through an immersive guide on the Bio imervise reality platform for making a direct veneer in composite resin and makeup on a dental element. This immersive guide method is described through a clinical case (Figure 1), the professional requested the immersive guide through the Bio immersive reality platform, in which he filled out a request with case descriptions and attached files of the patient's exams, the platform's multidisciplinary team got in touch for the approval of the planning and design of the guide, which sent a link via WhatsApp or email to the professional who accessed the link on their cell phone (Figure 2) and applied the immersion that is a virtual (Figure 3).

Figure 1. Initial

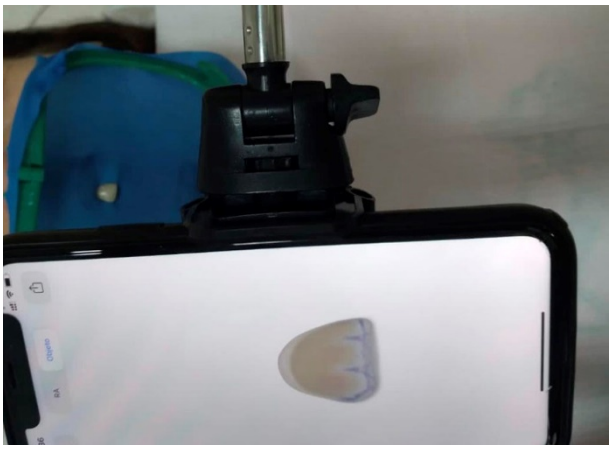

Figure 2. Immersive guide viewed by mobile

Figure 3. Performing the veneer and makeup procedure on element 11 through the immersive guide

Figure 4. Element 11 facet and makeup finished

A direct veneer was made in composite resin layered and made up on element 11, following all the principles and technical descriptions referring to restorative materials and layering and makeup techniques (Figure 4). The direct veneer in composite resin layered and made up was made through the immersive guide in extended reality, reproducing the planned anatomical shapes and structures and the composition of the colors of the dental element were applied according to plan. And as a result, we obtained a simple, standardized procedure with excellence in the reconstruction of the anatomy and color of element 11. Procedure training and simulations, technique learning, patient motivation are applications of extended reality. Solutions in digital technologies are the trend for dentistry in the future. Virtual and augmented realities are good tools for education and clinical treatment applied to dentistry in the future all departments will be able to apply these technologies in training and clinical practices (Huang *et al*., 2018). In restorative dentistry, composite resin systems combined with direct restoration techniques have been described in the literature to simplify and increase the excellence of clinical practice (D'Onofre *et al*., 2020). Planning based on photographs, waxing-diagnosis and creation of a virtual digital mock up helps in the restoration, is clinically reproducible and predictable (Camilo, 2019). The reported technique with the use of extended reality consists of a simple application based on concepts and techniques already used in clinical practice, which are the layering of composite resin and makeup with pigments (Alves *et al*., 2021; Campos *et al*., 2021), the agility in virtual planning reflects on the final result not being exclusively dependent on the skill and experience of the professional, allowing through digital tools to raise the level of excellence of the procedures.

Some advantages of using the virtual immersivo guide: biosafety, patient comfort, predictable results, great result in terms of anatomy, design and texture very similar to the planning, obtaining a natural and harmonic final result without the need to waste time with the use of diamond burs and discs for sculpting the anatomy. No physical barriers giving freedom of interaction. No technical skill or training required. Lower cost. Simple and practical technique without the need to have special equipment or software. We have the possibility to plan and execute the makeup on the dental element guided with all the indications and specifications relevant to the case, without the need for skill and prior training in makeup, the references are through the immersive guide link and the report sent by the platform. Some differences between physically guided restoration techniques consist of physical limitations, dimensional stability, interaction difficulties, costs, patient visualization for planning approval, and patient discomfort during the use of the physical guide in the procedure. (Azuma, 1997; Mariotto *et al*., 2020; Zanchin *et al*., 2021). The technologies of realities are new to dentistry, we have a lot to study and develop, creating several possibilities for dental practice and education. Digital dentistry has already integrated the real patient into the virtual world, generating the virtual 3D patient through consolidated techniques and technologies, and the use of augmented, mixed and extended realities meets the concepts of digital dentistry and keeps the patient in the virtual world, bringing technology, planning, design for navigation and interaction with the real patient, the virtual and real world connected and integrated in favor of the excellence of the procedures to be performed on patients, always thinking about the benefits for the patient and contributing to the innovation and evolution.

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