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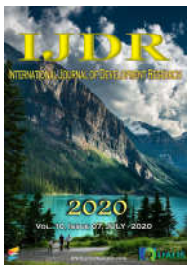

RESEARCH ARTICLE OPEN ACCESS

DIRECT CLASS IV RESTORATION: TECHNICAL REPORT

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ABSTRACT

The objective of this work was to approach a freehand restorative technique for class IV in composite resin. The procedure was performed on a mannequin containing elements 12, 11,21 and 22, the technique was performed on element 21, the same was provided with the ready preparation, vestibular bevel, the resins of choice were DA3, BA3, EA2 e CT all from Z350 - 3M, as each contains different chromas. Today for restorations on teeth older than 3M it is the good option on the market, with the patent for nanoparticulate resins. The professional must learn the rules of aesthetics of natural teeth for the use of these materials. Treating that natural teeth are polychromatic, while composite resins are monochromatic. Given the existence of a wide variety of resins and technical possibilities, the following text proposes a clinical sequence of reconstruction of anterior teeth with compromised incisal angle due to fracture. The stratification with composite resin favors the naturalness so desired by the patient, because the invisibility of the restoration is achieved, leaving the smile more harmonious and beautiful, which certainly improves self-esteem.With the evolution of adhesive dentistry, it is possible to perform aesthetic procedures with greater longevity and naturalness already mentioned.

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INTRODUCTION

For a long time, most of the destruction of the incisal angle was due to lesions of interproximal caries (Yanikian et al., 2019). They are more frequent in the upper anterior teeth of male adolescents (Brown, 2019). With the emergence of acid conditioning in enamel in 1956 proposed by Buonocore, dentistry was never the same, a new vision was applied to restorative techniques and with the discovery of the hybrid layer by Nakabayashi in 1982. Dentistry entered the Conservative Era and much research in this line, they brought countless techniques and ways to preserve healthy dental structure in the execution of cavity preparations. With the evolution in the adhesiveness of resinous systems, several types of direct restorations can be performed today with excellent longevity, also in fractures of incisal angles with accepted disocclusion (Andreasen, 2001). In the unavailability or impracticability of using the dental fragment, bonding is no longer an alternative treatment, where we will have the use of adhesive systems and composite resins for direct use (Andreasen, 2001). The growing technological innovation, current composite resins, especially nanoparticles, manage to gather functional mechanical characteristics for regions subjected to high stresses, with adequate optical properties to achieve aesthetic excellence in restoring anterior teeth (Baratieri, 2001; Cortes, 2001). The longevity of restorations in anterior teeth depends on the preparation of the cavity, material used and technique developed.[5]Therefore, the objective of this work was to approach the direct hand restorative technique of class IV anterior teeth, emphasizing the clinical protocols, materials used, step by step of the restoration execution.

METHODS

Study Design: Meta-analysis, case reports, retrospective, prospective and randomized studies with qualitative and/or quantitative analysis were included. Initially, keywords were determined by searching the DeCS tool (Descriptors in Health Sciences, BIREME base) and then verified and validated by

the MeSH System (Medical Subject Headings, the US National Library of Medicine) to achieve a consistent search.
The present study was about a description and technical report on direct restoration of anterior teeth followed by a literary review. The main descriptors (Mesh Terms) used were "*Restoration. Composite resin. Anterior teeth. Class IV anterior teeth. Direct restorative technique*". For further specifications, the description "*Direct restorative technique*" for refinement was added during the research, following the rules of CARE - Case Reports Guidelines. Available at: https://www.care-statement.org/).The bibliographic search was carried out through online databases: PUBMED, SCOPUS, COCHRANE LIBRARY AND GOOGLE SCHOLAR. The deadline and related research were set, covering all available literature on virtual libraries.

Series of Articles and EligibilityFor Literary Review: A total of 55 articles were found involving laminating with composite resin. Initially, the existing title was excluded and duplicated according to the interest described in this study. After this process, the abstracts were evaluated and a new exclusion was performed. A total of 21 articles were evaluated in full and 16 were included and discussed in this study.

Technical Report: For direct adhesive restorations on fractured anterior teeth, it is important to note the following factors: anamnesis, trauma etiology, assessment of oral health status and extent of the fracture, radiographic examination, degree of periodontal involvement and endodontics (Paolone, 2014).

Isolation of the operative field: Adhesive techniques require an operative field without contamination and moisture. It is recommended to use absolute isolation with a canine-to-canine rubber dam with clamps on premolars (Baratieri, 2001). On the mannequin absolute isolation was made with strings with dental floss on all upper incisors.

Tooth preparation: After cleaning the surface with more water to remove any extrinsic stains, the colors necessary for the restoration were determined before preparing the tooth, with a slight bevel at an angle of 45 ° with the diamond tip 2200, or placing the insulation. The tooth should be slightly moist for better color selection, but without the presence of biofilm (Paz, 2018). A Fillon thread sealing tape is placed on neighboring teeth to protect them from acid and adhesive attacks by not allowing them to touch adjacent teeth. 37% phosphoric acid was applied over the enamel for 15 seconds. After that, the acid was washed with abundant water and dried with gentle air jets according to the manufacturer's instructions. With a disposable micro-applicator, the adhesive system wasapplied, using the Single Bond Universal 3M adhesive for 20 seconds and air jets for 5 seconds of polymerization. The freehand technique was performed, where a polyester tape was placed on the palatal face of the tooth for the insertion of Filtek Z350 XT CT Translucent - 3M resin to make a thin palatal wall. Polymerization is carried out both buccal and lingual, and cannot touch the dental surface.A translucent resin in the CT tone was applied to the palate. To avoid pre-polymerization of the resin, the reflector light must be removed from the working area. The increment of the resin cannot exceed 2mm of thickness (Van Dijken, 2010). Afterwards, with a spatula of insertion, the increment of resin Filtek Z350 A3 Dentin is placed to make the artificial dentine, being polymerized for 20 seconds.

Then, the Filtek Z350 A3 Corpo resin was used on the dentin resin, polymerized for 20 seconds. Throughout the incisal edge, with the help of a brush, an increment of Filtek Z350 WB resin was placed to make the incisal halo and polymerized for 20 seconds. After that, the last layer of Filtek Z350 A2 Enamel resin was added, this was positioned with an insertion spatula and sculpted with the help of a brush.

Functional fit: The functional adjustment must precede the finishing and polishing (Baratieri, 2001). For this, it is necessary before the restoration to check the contact points in maximum habitual intercuspation (MIH), using a carbon (Accu-Film). Check-in which teeth the lateral and protrusive disocclusion guides occur and try not to modify them. After the restoration, check the MIH contacts again, and if there is any unwanted contact, reduce it with a fine-grained diamond tip so that the points coincide with those marked before the restoration (Calixtro, 2009).

Finishing and polishing: The finishing can be done with multi-laminated drills or fine-grained and extra-fine diamond tips in high rotation. Spherical tips (not used on anterior teeth) and pear-shaped or barrel tips (used on the palatal face) can also be used in order to remove the coarsest excesses of the material.[4] The finishing of the proximal surfaces can be done with the help of sanding strips 2mm wide (Baratieri, 2001). As the resin used is a nanoparticle, polishing can be immediate (Paolone, 2014). Flexible sequential discs and Felt discs with diamond paste (Sof-Lex Pop On 3M Sanding Disc) were used.

DISCUSSION

The resins presented in this work were Filtek Z350 3M. Selection involves determining the hue, chroma and value. The selection must be made based on factors related to the material itself, on clinical factors, on the professional's preference (Yanikian, 2019; Brown, 2019). Natural teeth are polychromatic, and while composite resins are monochromatic, it is therefore very difficult to achieve aesthetic excellence with a single value of composite resin, although they do not always compromise the smile's aesthetic (Brown, 2019; Andreasen, 2001). Inadequate light curing can lead to undesirable consequences such as: decreased the adhesionresistence of adhesives, decreased margin staining of the composite resin due to a partial reaction of the accelerator and absorption of dyes, decreased wear resistance due to incorrect polymerization (Baratieri, 2001). Thus, direct restorations of the anterior teeth, especially in the central incisors, symmetry plays an important role (Paolone, 2014). A 15-year retrospective study investigated the impact on survival, when a repair is seen as a failure or not, in composite anterior restorations. Data were collected from the files of patients at a private dental clinic, including patients with direct composite restorations placed on the anterior teeth (Class III, Class IV, or veneer). The data were analyzed considering whether or not to repair as a failure. One hundred and forty-four patient records were included, with 634 restorations. At 15 years of age, Class III / IV restorations showed 69% survival and 2.4% annual failure rate (AFR) when the repair was not considered a failure and 64% and 2.9% AFR, respectively when the repair was seen as a failure. For direct veneers, at 5 and 10 years of follow-up, survival dropped from 85% to 74% and from 52% to 38%, respectively, when the repair was considered a failure. In general, restorations placed in the upper jaw had an increased risk of failure compared to

the lower jaw, and restorations in central incisors had a higher risk of failure compared to dogs. Therefore, composite repair appears to be a suitable alternative for class III, class IV and veneer restorations, as it was able to increase the survival of restorations performed on anterior teeth (Van de Sande, 2019). Also, a prospective observational cohort study aimed to estimate the survival of a hybrid compound placed by a clinician up to 8 years of follow-up. All patients were referred and recruited for a prospective observational cohort study. A composite was used: Spectrum® (DentsplyDeTrey). Most restorations were performed on the upper anterior teeth using a Dahl approach. A total of 1010 direct composites were placed in 164 patients. The average follow-up time was 33.8 months. 71 of 1010 restorations failed during follow-up. The time to failure was significantly longer in older individuals and when there was a lack of posterior support. Bruxism and an increase in the vertical occlusal dimension were not associated with the failure. The proportion of failures was higher in patients with a Class 3 or edge-to-edge incisal relationship than in Class 1 and Class 2 cases, but this was not statistically significant. There were more failures in the lower arch (9.6%) compared to the upper arch (6%), with the largest number of composites being placed on the upper incisors (n = 519) (Milosevic, 2016).

In this sense, creating perfect direct composite restorations is a challenge due to the limitations of many materials that affect the integration of shadow or surface quality and color stability. Along with technological disadvantages, a certain complexity and lack of predictability in the clinical application were inherent to the technique and made it elitist for a long time. The concepts of shading and layers have progressively evolved from a simplistic, known-histologic bilaminar technique to a multi-layer approach (3 to 4 or more layers), following the Vita Classic ™ system. One of the most achieved concepts is polychromatic stratification, which uses a variable number of layers (basically VITA ™ opaque dentin or not VITA ™, chromatic enamel, and translucent/opalescent enamel), driven by the natural optical composition of the tooth. Also, a simplified non-VITA ™ shading system was developed with a reduced number of layers, with a layer of dentin and enamel and effect shades, known as the concept of natural stratification, aiming at the same optimal and natural aesthetic integration (Dietschi, 2016). Therefore, restoration of anterior tooth fractures is a common dental procedure. Direct and indirect options are clinically acceptable for repairing fractured teeth. For a large class IV fracture, treatment planning is time-consuming and artistic skills are required to achieve the best results (Romero, 2017). In this sense, comprehensive knowledge of the optical properties of composite resins is essential to obtain optimal results in direct anterior restorations. The approach of combining a composite resin designed for whitened teeth with highly opalescent and translucent resins, as well as combining natural dental anatomy, provided excellent aesthetic results. The adequate reproduction of the optical characteristics was confirmed by the increased contrast of the final photograph, which highlighted the translucency achieved in the area of the mamelons (Sugii, 2019). Thus, imitating the appearance of the adjacent natural tooth is a challenge when restoring a fractured anterior tooth. A clinical report described a modified index technique to restore a class IV defect. A replica of the restored tooth was manufactured with computer-aided design and 3D printing technology, which accurately imitated the contralateral incisor.

The lip and lingual silicone indices were developed on the replica to transfer the projected contour to the tooth to obtain a highly aesthetic and precise restoration (Gao, 2017).[16]

Conclusion

Today for restorations on anterior teeth, the professional must learn the rules of aesthetics of natural teeth for the use of these materials. Treating that natural teeth are polychromatic, while composite resins are monochromatic. Given the existence of a wide variety of resins and technical possibilities, the following text proposes a clinical sequence of reconstruction of anterior teeth with compromised incisal angle due to fracture. The stratification with composite resin favors the naturalness so desired by the patient because the invisibility of the restoration is achieved, leaving the smile more harmonious and beautiful, which certainly improves self-esteem.With the evolution of adhesive dentistry, it is possible to perform aesthetic procedures with greater longevity and naturalness already mentioned.

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