

USE OF GLASS FIBER POST (EXACTO - ANGELUS) TO REINFORCE DIRECT RESTORATIONS IN FRACTURED TEETH - CASE REPORT

Jorge Eustáquio¹ - Rafael Calixto² - Ilana Pais Tenório³

*1 Master's Degree in Restoration Dentistry - CPO São Leopoldo Mandic (Campinas - SP)
Professor of Specialization in Dentistry Course at ABO - AL (Maceió - AL).*

*2 Specialist, Master and doctoral candidate in Restoration Dentistry - UNESP (Araraquara - SP)
Professor of Specialization in Dentistry Course at ABO - AL (Maceió - AL).*

*3 Student of Specialization in Dentistry at ACETAO (São Paulo - SP)
Professor of Dentistry Development Course at NEO Odontologia (Maceió - AL)*

Clinical case report

A 30-year-old female patient sought treatment after a trauma that caused the fracture of three dental elements, 12, 11 and 21. Upon detection of necrosis in element 11, the patient was referred for endodontic treatment. The necrosis caused by rupture of blood vessels resulted in darkening of the coronary portion, and it was not possible to reestablish the aesthetic pattern only with the reconstruction of class IV in composite resin. (Picture 1 - 4334)

When assessing the treatment possibilities, internal bleaching was ruled out due to the possibility of external root resorption, since the dental fracture resulting from the trauma had occurred less than 1 year prior to treatment.

Faced with the need to mask this stain, a slightly more invasive wear of the darkened cervical region is necessary to restore dental aesthetics, either with a facet in a highly aesthetic composite resin or with a metal-free ceramic crown or facet (Metalfree).

To provide better retention and higher strength

for the composite resin, it is necessary to install an intraradicular glass fiber post to a direct facet or to a filling core of a metal-free ceramic crown.

In this case, in agreement with the patient, the installation of a conical intraradicular aesthetic post in glass fiber (Exacto - ANGELUS), with a facet in nanohybrid composite resin (IPS Empress Direct - IVOCAR VIVADENT) in the darkened element 11 was performed, as well as restorations on teeth 12 and 21 with nanohybrid composite resin (IPS Empress Direct - IVOCAR VIVADENT).

REPORT ON THE TREATMENT OF TOOTH 11

After treatment with the endodontist, the patient sought assistance in our clinic because she was not satisfied with the final color of tooth 11. Tooth 11 presented a satisfactory endodontic treatment, confirmed by periapical radiography, with no pain at horizontal and vertical percussion, and with a length of 24 mm from the apex to the incisal edge. For the correct fitting of the conical glass fiber post and to obtain sufficient intraradicular depth for force distribution, it was chosen to make an intraradicular preparation of 17 mm in height, preserving 7 mm of the remaining obturator material at the root apex. (Picture 2 - 4360)

The glass fiber aesthetic post selected through the post selection template was EXACTO (Angelus) number 1. The gutta-percha obturation was performed with a No. 3 Largo bur and the final preparation of the channel was performed with the No.1 bur from the EXACTO post system with a guide at the ideal length. After the preparation, the correct positioning of the

post and the perfect quality of the obturation were verified through a periapical radiography with the post in position.

The preparation of the post and the tooth followed the following protocol, respectively:

POST:

- Application of 37% phosphoric acid (Angelus) for a period of 30 seconds; (Picture 3 – 4367)
- Washing with water;
- Drying with air jet;
- Application of Silano (Angelus) for 1 minute; (Picture 4 – 4375)
- Drying with a slight air jet for 5 seconds;
- Application of the Fusion Duralink (Angelus) chemical adhesive; (Picture 5 - 4376)
- Adhesive excess removal with dry microbrush;
- The adhesive polymerizes when in contact with the tertiary amine present in the resin sealer.

TOOTH:

- Application of 37% phosphoric acid (Angelus) for a period of 15 seconds;
- Washing with water for 30 seconds;
- Drying of the root dentin with absorbent paper cones, one cone being subsequently to the other until they no longer show signs of water;
- Application of the Fusion Duralink (Angelus) primer with a long microbrush compatible with the channel (Cavibrush – FGM) for 20 seconds; (Picture 6 - 4380)
- Evaporation of the primer with a slight air jet for 5 seconds;
- Application of the Fusion Duralink (Angelus) chemical adhesive; (Picture 7 - 4381)
- Air jet and excess removal with absorbent paper cone.

After the preparation of the post and the tooth, we performed the sealing. For this, a resinous sealer with chemical polymerization reaction in color A3 was used. (Picture 8 – 5528)

Finally, a palatal restoration with the IPS Empress

Direct (Ivoclar Vivadent) nanohybrid composite resin in colors A3 Dentin and A2 Enamel was made to cover the sealed post.

In the second clinical session, a direct facet of tooth 11 was performed. For this we proceeded with the color selection; preparation for direct facet using a diamond tip 2135 in high rotation and 2135F in contra-angle multiplier, with this preparation having a slight deepening in the most-darkened areas for a better aesthetic result.

After the preparation, the surgical field was isolated using the modified absolute isolation technique, followed by acid etching of the tooth with 37% phosphoric acid (30 seconds in enamel and 15 seconds in dentin), washing with water, removal of excess moisture with cotton ball, Single Bond 2 (3MEspe) adhesive application with a regular size microbrush, excess removal of adhesive with dry microbrush, light air jet and photopolymerization for 20 seconds. The facet was incrementally made with the IPS Empress Direct (Ivoclar Vivadent) nanohybrid composite resin in the sequence below, photopolymerizing each layer for 10 seconds:

- Initial layer with Monopaque (Ivoclar Vivadent) color 210, with a fine marten-hair brush, covering about 60% of the surface masking the darkened dental area;
- Dentin Resin Layer: IPS Empress Direct (Ivoclar Vivadent) in the color Dentin A2 in the cervical third and Dentin A1 in the middle and incisal thirds;
- Incisal effects: using Filtek Z350 XT resin (3MEspe) in the color WD for incisal halo, Tetric Color (Ivoclar Vivadent) coloring in white in the mamelon region and blue for an opalescent effect;
- Chromatic enamel coating: A1E;
- Chromatic enamel coating: Trans 30;

The construction of the facet was finished with an overpolymerization with glycerin gel for 60 seconds.

From this moment, the restoration was finished and polished with the Sof Lex XT pop-on (3MEspe) file disc, a sequence of Jiffy (Utradent) polishing rubbers in green, yellow and white, and the final polishing was performed using the Flexi-buffy disc (Cosmedent) associated to Enamelize (Cosmedent) polishing paste and Mineral Oil - Nujol. The final aspect of the restored tooth can be seen in Picture 9 (6069^a).

DISCUSSION

Decision making in the treatment planning is quite difficult in these cases. There are several treatment possibilities, each with its advantages and disadvantages. Thus, the way forward for aesthetic rehabilitation is decided using eliminatory criteria.

In this case, the dental whitening alternative was discarded due to the possibility of external cervical resorption based on the short time elapsed between the trauma and the date of the restorative treatment³. In addition, the redarkening rate of endodontically treated teeth reported in the literature is considered high (about 10 to 20% in up to 18 months of evaluation and approximately 50% for eight years of follow-up^{6,7}).

The use of glass fiber posts for retention of extensive restorations has been widely discussed in the literature. The aesthetic characteristics of the restorations in endodontically treated teeth are highly influenced by the intracoronary filling material. Metallic posts significantly limit the transmission of light through aesthetic restoration⁸. Thus, the color characteristics of the glass fiber posts have a great advantage over the carbon fiber and metal posts. Among the advantages of using this material, we could mention the following:

- Favorable elastic behavior⁹;
- More uniform distribution of strains along the root^{4, 10};
- Color compatible with aesthetics¹¹;
- No corrosion¹¹;
- No laboratory stage¹¹;
- No need for additional wear or expulsive preparation internally at the root¹¹;
- Association with direct restorations, onlays, ceramic laminates and total crowns¹¹;
- Possibility of removal and resealing of a new post in case of post failure¹¹;
- Rare fractures provide more favorable situations to reuse the dental remnant¹²;
- Some post systems have high translucency and light transmission features, which may aid in the photopolymerization of an adhesive and sealing system¹¹.

The adhesive system (Fusion Duralink - Angelus) and the sealing agent used in the sealing of the post in this clinical case have aspects of chemical

polymerization. The main limitation of intraradicular adhesion with conventional resin sealers and adhesives is the distance that the photopolymerizer light has to travel to polymerize these materials¹³. Therefore, the use of exclusively photoactivated adhesives is contraindicated since the incoming light in the middle and apical thirds of the root is not as effective¹⁴.

In this case, the use of the post made of glass fiber could have been associated with a direct composite resin restoration (facet) or a metal-free ceramic crown. The main advantages of the ceramic in comparison to the resin are durability, color stability, gloss and polish, resistance to masticatory efforts, among others. The main disadvantage is the cost, which was a determining factor in this case for the patient to choose the restorative treatment in composite resin.

The association of composite resins and glass fiber posts represents a conservative treatment alternative, better preserves the coronary remnant and reduces treatment costs when compared to prosthetic procedures¹¹.

However, the restorative treatment in composite resin has some limitations. Among those, regarding professional skills, we could mention the need for technical skills and deep knowledge of the restorative material; regarding the material, the risk of staining and decrease of the surface gloss, and regarding the patient, the maintenance of the results depends on the habits and diet of the patient¹¹.

These limitations were solved by the use of a composite resin of high aesthetic quality and strength, executed by a skilled and knowledgeable expert in the material and technique and with the scheduling of periodic appointments for follow-up and the restorations will be repolished as necessary.

CONCLUSION

In this article, we show several possibilities for treating a tooth affected by a trauma. The case study for developing a treatment plan is critical to achieving success. Features of glass fiber posts such as safety, aesthetics, strength and elasticity ensure a conservative and biocompatible procedure. In this report, we show that using a glass fiber post with appropriate materials and careful techniques allows the restorative treatment to have satisfactory results.

FIGURES

Figure 1



Figure 2

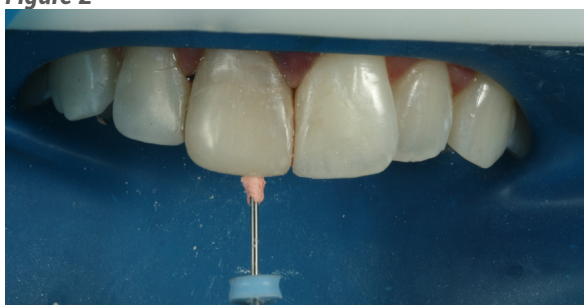


Figure 3



Figure 4

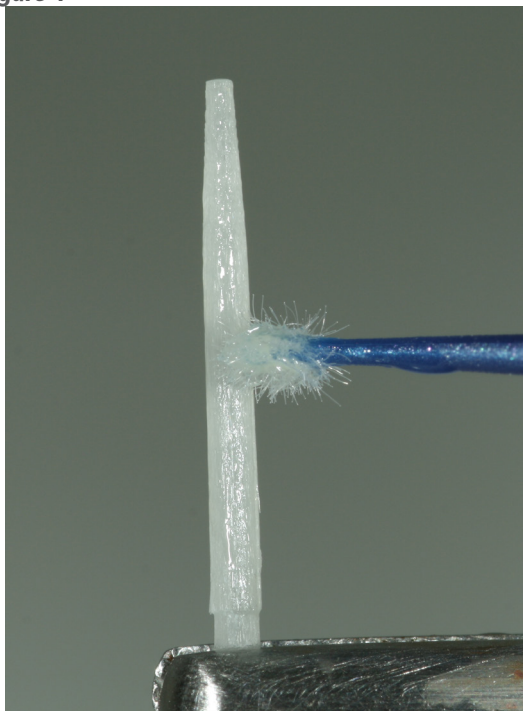


Figure 5

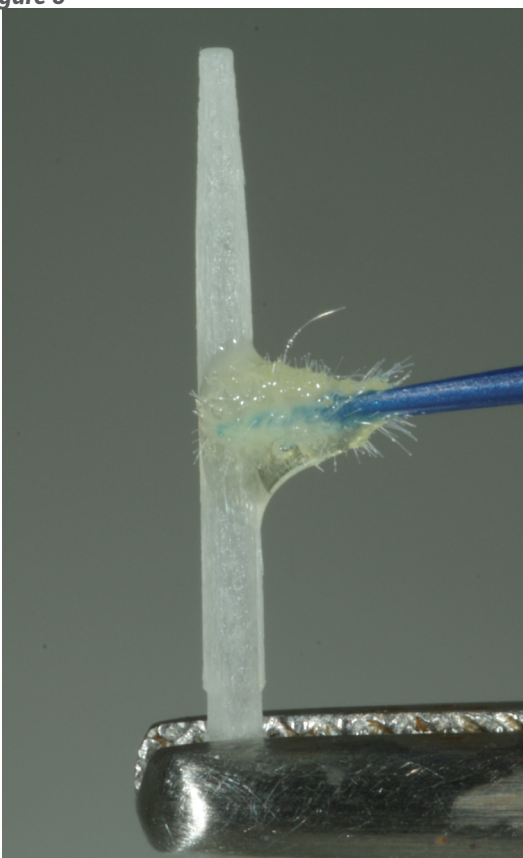


Figure 6



Figure 8

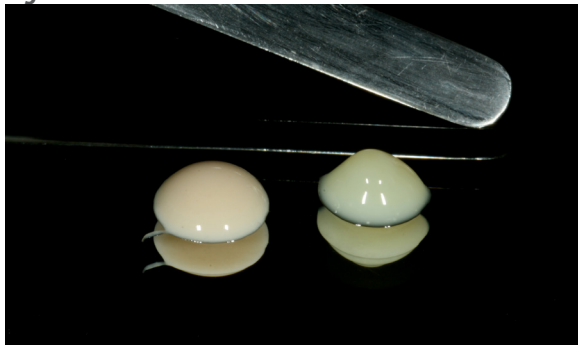


Figure 7



Figure 9



REFERENCES

1. Andrade OS, Kina S, Hirata R e Arita C. Planejamento e Técnica. Adesão Intra-Radicular E As Implicações. Clínicas Sobre Restaurações De Dentes Tratados Endodonticamente. In: KINA, Sidney. ODONTOLOGIA ESTÉTICA. 2008
2. MacIsaac AM, Hoen CM. Intracoronar bleaching: concerns and considerations. J Can Dent Assoc. 1994 Jan;60(1):57-64. Review.
3. Attin T, Paqué F, Ajam F, Lennon A M. Review of the current status of tooth whitening with the walking bleach technique. International Endodontic Journal, 36, 313-329, 2003.
4. Ferrari, M.; Vichi, A.; García-Godoy, F. Clinical evaluation of fiberreinforced epoxy resin posts and cast post and cores. Am J Dent. 2000 May;13(Spec No):15B-18B.
5. Calixto LR, Silva MAB, Clavijo VGR, Bandeca MC, Oliveira Jr OB, Andrade, MF. Tratamento de Dentes Despolpados: Aspectos Biomecânicos na Escolha do Retentor Intrarradicular. Dental Science Clínica e Pesquisa Integrada 2008; 2(7): 225-231
6. Friedman S, Rotstein I, Libfeld H, Stabholz A, Heling I. Incidence of external root resorption and esthetic results in 58 bleached pulpless teeth. Endod Dent Traumatol. 1988; 4(1):23-6
7. Waterhouse PI, Numm M. Intracoronar bleaching of nonvital teeth in children and adolescents interim results. Quintessence Int. 1996; 27 (7):447-53
8. Fradeani M, Aquilano A, Barducci G. Aesthetic restoration of endodontically treated teeth. Pract Periodont Aesthet Dent. 1999; 11(7):761-8.
9. Assmussen E, Peutzfeldt A, Heitmann T. Stiffness elastic limit, and strength of newer types of endodontic posts. J Dent. 1999; 27:275-8.
10. Ferrari M, Vichi A, Mannocci F, Mason PN. Retrospective study of the clinical performance of fiber posts. Am J Dent. 2000; 13:9b-13b.
11. Muniz L. Reabilitação estética em dentes tratados endodonticamente: pinos de fibra de vidro e possibilidades clínicas conservadoras. São Paulo: Santos, 2010.
12. Salameh Z, et al. Fracture resistance and failure patterns of endodontically treated mandibular molars restored using resin composite with or without translucent glass fiber posts. JOE. 2006; 32:752-5.
13. Muniz L, Mathias P. The influence of sodium hypochlorite and root canal sealers on post retention in different dentin regions. Oper Dent. 2005; 30(4):533-539.
14. Roberts HW, Leonard DL, Vandewalle KS, Cohen ME, Charlton DG. The effect of a translucent post on resin composite depth of cure. Dent Mater. 2004; 20(7):617-22.