Dental Traumatology 2006; doi: 10.1111/j.1600-9657.2005.00331.x

DENTAL TRAUMATOLOGY

Case Report

Use of glass fiber post and composite resin in restoration of a vertical fractured tooth

Fidel SR, Sassone L, Álvares GR, Guimarães RPS, Fidel RAS. Use of glass fiber post and composite resin in restoration of a vertical fractured tooth. © Blackwell Munksgaard, 2006.

Abstract – Combined coronal and vertical root fractures are difficult to treat and extraction of the affected tooth is quite often indicated. In anterior teeth, esthetics and function must be reestablished immediately. This case describes the restoration of a fractured upper right central incisor using a glass fiber post and adhesive composite. At the follow-up appointment, 13 months later, clinical and radiographical examinations revealed the glass fiber post and restoration in place, suggesting the efficacy of the treatment in maintaining fractured tooth.

Sandra Rivera Fidel[1], Luciana Sassone[2], Gustavo Ribeiro Álvares[1], Rodrigo Prada Sant'anna Guimarães[3], Rivail Antônio Sérgio Fidel[1]

[1]School of Dentistry, UNIGRANRIO University and School of Dentistry, Rio de Janeiro State University, Rio de Janeiro, Brazil [2]School of Dentistry, Rio de Janeiro State University, Rio de Janeiro, Brazil; [3]School of Dentistry, UNIGRANRIO University, Rio de Janeiro, Brazil

Key words: vertical root fracture; trauma; composite; glass fiber post

Dr Rivail Antônio Sérgio Fidel, Rua Dr Otavio Kelly, 63 apt. 301, Tijuca, 20.511-280 Rio de Janeiro, RJ, Brazil
Tel.: 55 21 2288 6860
Fax: 55 21 2571 2454
e-mail: rivail@uerj.br

Accepted 9 November, 2004

Automobile accidents, impact sports injuries or falls are common causes of dental trauma. In particular, crown fractures may lead to the loss of the affected tooth. Vertical root fractures are extremely hard treatment problems to solve.

A crown-root fracture is defined as a fracture that involves the enamel dentin and the cementum, and can be classified as a complicated fracture if the pulp is involved (1). As stated, most teeth with vertical root fractures are extracted (2).

If the pulp is not involved the most probable symptomatology of this injury is pain when chewing as a result of the movement of the coronal fragment (3).

Traumatized anterior teeth require quick functional and esthetic repair. Composite materials are commonly used in clinical dentistry for esthetic restorations (4). Because of the poor mechanical resistance of these materials, different approaches to strengthening composite materials have included reforging their resinous matrix with fibers (5) or glass fiber posts. The possibility of successfully solving an incomplete vertical root fracture using adhesive resin after endodontic treatment has already been reported (6). Post and cores provide predictable restorative options for endodontically treated teeth, and in addition, non-metallic post systems provide excellent esthetic results (7).

The purpose of this report was to present an esthetic solution with a glass fiber post in a complicated vertical crown-root fracture.

Case report

A 9-year-old female patient presenting a complicated vertical crown-root fracture was seen at the Dental Traumatology Center, UNIGRANRIO University (Duque de Caxias, Rio de Janeiro, Brazil). Clinical and radiographic examination confirmed the crown-root fracture and involvement of the upper right central incisor (Figs 1 and 2). The patient related pain during swallowing and bleeding through the line of fracture. Root canal treatment was performed in a single visit and an adhesive temporary restoration was made. Due to the extension of the root fracture, reestablishment of the lost biologic space was needed prior to esthetic and functional recovery. In order to expose the entire fracture line, the tooth was extruded orthodontically.

Fig. 1. Clinical appearance of right central incisor with crown-root fracture.

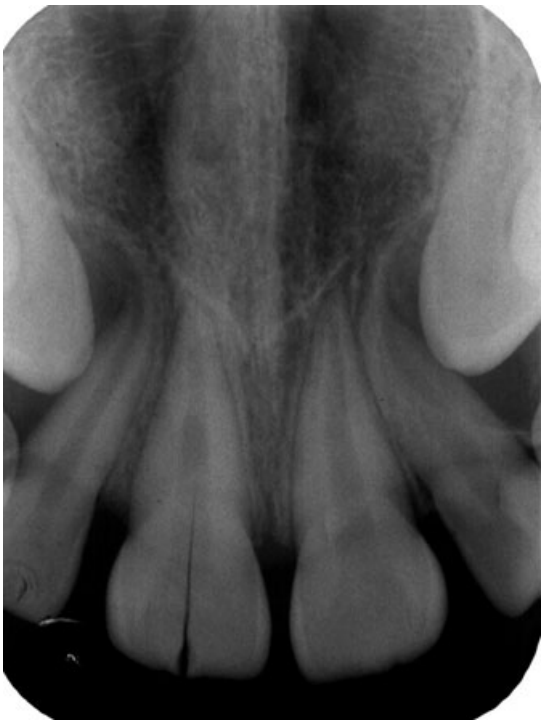

Fig. 2. Radiograph showing extent of vertical crown-root fracture.

After 2 weeks, the fracture line was completely exposed allowing complete vision of the tooth to be restored. The root canal filling was removed to receive a glass fiber post (FibreKor Post System™; Jeneric®/Penton® Incorporation, Wallingford, CT, USA), which was cemented with a dual adhesive cement (Enforce™; Dentsply, Petropolis, Rio de Janeiro, Brazil) (Fig. 3). Final restoration of the dental crown was performed with light-cured resin (TPH™; Dentsply) (Fig. 4), and occlusal adjustment was performed.

Fig. 3. Radiograph after cementation of glass fiber post.

Clinical and radiographic control examinations 13 months later confirmed the integrity of the fiber glass post and light-cured resin as well as a normal radiographic appearance of the root (Fig. 5).

Discussion

Although vertical root fractures are considered difficult to treat, the case reported here showed a possible solution.

Fig. 4. Final esthetic result after restoration and occlusal adjustment.

Fig. 5. Radiograph at 13-month follow-up.

The first aspect to be considered is correct and accurate diagnosis. The vertical fracture can be easily detected radiographically when it is in a buccal-lingual direction (1), as it was in our case. It was possible to correctly diagnose the fracture and its extension reaching the cervical third of the root canal.

Orthodontic extrusion was the least invasive choice of treatment (8) in order to expose the whole fracture. Osteotomy and gingivectomy would not be indicated as retraction of the gingival tissues would affect the esthetics in the anterior region. Because crown-root fractures are very frequent findings, knowledge of different techniques to solve these kinds of cases is very important (9).

Concerning restorations of traumatized anterior teeth, both esthetics and mechanical resistance to fracture are of great importance for good, long-lasting results (4). In order to increase mechanical resistance, a glass fiber post was used. The results of *in vitro* (10, 11) and *in vivo* (12) studies indicate that non-metal posts can be used when ample coronal dentin remains and the crown is well supported by remaining tooth structure. In some cases, instead of glass fiber post, Ribbond® fibers were used (4). The use of such fibers represents an effective means of conferring higher mechanical strength to composite restoration without changing the esthetic result. An esthetically satisfying result was obtained in this case with the use of a glass fiber post and composite restoration.

Newer adhesive resin luting agents are advocated for the luting of posts because they are reported to bond the post to the tooth structure for efficiently in comparison with the traditional cements, which produce only frictional resistance (13). In this study, a bonding system and a light-cured resin were used to bond the post and restore the crown. The bonding of a post to the tooth structure should improve the prognosis of the post-core restored tooth by increasing post retention (14) and by reinforcing the tooth structure.

Conclusions

The case reported showed that a combined technique of glass fiber post and composite could be a simple and efficient procedure for the treatment of anterior traumatized teeth with excellent esthetic and functional results.

Acknowledgement – The authors thank Dr Ariadne Letra for critical revision of this work.

References

1. Andreasen JO, Andreasen FM. Texto e atlas colorido de traumatismo dental. Porto Alegre: Artmed Editora, 2001. 769 p.
2. Kudou Y, Kubota M. Replantation with intentional rotation of a complete vertically fractured root using adhesive resin cement. Dent Traumatol 2003;19:115–7.
3. Andreasen JO, Andreasen FM. Traumatismo Dentário: soluções clínicas. São Paulo: Panamericana, 1991. 168 p.
4. Vitale MC, Caprioglio C, Martignone A, Marchesi U, Botticelli AR. Combined technique with polyethylene fibers and composite resins in restoration of traumatized anterior teeth. Dent Traumatol 2004;20:172–7.
5. Samadzadeh A, Kugel G. Fracture strengths of provisional restorations reinforced with plasma-treated woven polyethylene fiber. J Prosthet Dent 1997;78:447–9.
6. Funato A, Funato H, Matsumoto K. Treatment of a vertical root fracture. Endod Dent Traumatol 1999;15:46–7.
7. Fernandes AS, Shetty S, Coutinho I. Factors determining post selection: a literature review. J Prosthet Dent 2003;90:556–62.
8. Bondemark L, Hallonsten A. Attractive magnets for orthodontic extrusion of crown-root fractured teeth. Am J Orthod Dentofacial Orthop 1997;112:187–93.
9. Fariniuk LF, Ferreira EL, Soresini GCG, Cavali AEC, Baratto Filho F. Intentional replantation with 180° rotation of a crown-root fracture: a case report. Dent Traumatol 2003;19:321–5.
10. Sidoli GE, King PA, Setchell DJ. An in vitro evaluation of a carbon fiber-based post and core system. J Prosthet Dent 1997;78:5–9.
11. Stockton LW, Williams PT. Retention and shear bond strength of two post system. Oper Dent 1999;24:210–6.
12. Bergman B, Lundquist P, Sjogren U, Sundquist G. Restorative and endodontic results after treatment with cast posts and cores. J Prosthet Dent 1989;61:10–5.
13. Plasmans PJ, Welle PR, Vrijhoef MM. In vitro resistance of composite resin dowel and cores. J Endod 1988;14:300–4.
14. Standlee JP, Caputo AA. Endodontic dowel retention with resinous cement. J Prosthet Dent 1992;68:913–7.