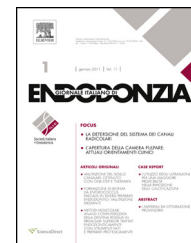




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CASE REPORT/CASO CLINICO

33° CONGRESSO NAZIONALE VINCITORE PREMIO GIORGIO LAVAGNOLI

Complex endodontic and conservative treatment of a traumatized central incisor



Recupero endodontico-conservativo complesso di un incisivo centrale superiore traumatizzato

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KEYWORDS

Open-apex;
MTA;
Direct restoration;
Dental trauma;
Composite.

Abstract

Objectives: The functional recovery of a tooth with open-apex already endodontically treated is possible thanks to the materials, such as the MTA, able to produce an effective seal of the apex which can induce a *restitutio-ad-integrum*. A direct composite resin restoration may then provide a coronal seal immediate and effective in time, able to ensure a complete healing of the endodontic pathology.

Materials and methods: The hereby-clinical case describes a combined approach (endodontic and conservative) for the aesthetic-functional recovery of a severely fractured upper incisor of a child of 11 years.

Results and conclusions: At the control visit, after 12 months from the completion of the coronal restoration, a complete healing of periradicular bone tissue is observed through Rx. Clinical examination showed gingival tissue without inflammation and the probing depth is not increased, despite the presence of a cavity margin placed below the gingival margin.

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PAROLE CHIAVE

Apice beante;
MTA;
Restauro diretto;
Trauma dentale;
Composito.

Riassunto

Obiettivi: Il recupero funzionale di un elemento dentario con apice beante già trattato endodonticamente è oggi possibile grazie a materiali, quali l'MTA, in grado di produrre un sigillo apicale efficace in grado di portare ad una restitution-ad-integrum. Un restauro diretto in composito può successivamente fornire un sigillo coronale efficace nel tempo, indispensabile per ottenere una guarigione endodontica completa.

Materiali e metodi: Il caso clinico presentato mostra un approccio combinato (endodotico e conservativo) per il recupero estetico-funzionale di un incisivo centrale superiore di un bambino di 11 anni.

Risultati e conclusioni: Alla visita di controllo, dopo 12 mesi dal completamento del restauro coronale, si può osservare dall'esame radiografico una completa guarigione dei tessuto osseo periradicolare. All'esame clinico si può apprezzare un tessuto gengivale non infiammato senza aumento di profondità di sondaggio nonostante un margine del restauro coronale posto sottogengiva.

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Introduction

Previous epidemiological studies claim that one in four people has past experience of dental trauma, with an annual incidence that, in the United States, ranging from 1 to 3% of the population.¹

The dental trauma may present different clinical situations, depending on the direction and the force with which they occur, which significantly affect the diagnosis, treatment and, most importantly, the prognosis of teeth involved. The most common dental traumas include fractures of the enamel (67% of cases), followed by enamel-dentin fractures (25.3%). Indeed, we can have different levels of fracture: involving only the clinical crown or, in the worst cases, with margins of fracture at the level of the gingival sulcus, below the CEJ or even engaging the root. In some of these cases may also be involved the endodontic portion of the tooth. In any case, it is fundamental for a proper treatment plan to identify properly the extension of the enamel-dentine fracture and which dental and/or periodontal tissues are involved.

The fracture extension leads, in fact, the treatment. Currently, when lesions are mostly localized above the CEJ, and the fragment lost is recovered, stored correctly and still intact, it can be repositioned thanks to adhesive techniques. When the portions of the clinical crown fractured are not retrieved, the tooth can be rehabilitated by means of direct or indirect adhesive restorative techniques.³ When you have complicated fractures or dislocations that lead to irreversible damage to the pulp tissue, endodontic therapy is necessary.⁴

All patients affected by dental trauma should receive a restorative treatment fast, simple and that gives good aesthetic and functional results. In cases of large losses of tissue, the rehabilitation of the anterior teeth of these patients is used obtained through indirect restorations.^{5,6} However, thanks to the development of composite materials and adhesive techniques, currently the direct restorations with composite resins, if properly planned, can provide excellent aesthetics and function in the face of a less invasive therapy.

Materials and methods

The patient P.S., 10-year-old male, has come to the Department of Operative Dentistry and Endodontics of The University of Turin because of an exacerbation of chronic apical periodontitis in the right upper central incisor with previous

dental trauma. Clinically, the tooth showed an incongruous and fractured composite restoration, made as a result of complicated coronal fracture extended below the gingival margin, due to an injury occurred three months earlier (Fig. 1). The periapical radiography showed that 1.1 has an open-apex with previous and incongruous endodontic treatment, endodontic material beyond the apex and a large periradicular osteolytic lesion (Fig. 2).

In order to resolve in the first instance the endodontic lesion an endodontic retreatment was performed. After having anesthetized the area, the field isolation was obtained by means of a rubber dam. Once the access to the root canal was created, the material employed for the previous endodontic treatment was removed. Then, to obtain cleansing and disinfection of the root canal without the risk that the solutions could go over-apex, alternating washes were performed with 5% sodium hypochlorite and 10% EDTA with the aid of a negative pressure system (Endovac, ...). Since the large diameter of the apex, a MTA apical-plug (ProRoot, Maillefer, Ballaigues, Switzerland) has been realized (Fig. 3). After a week, the proper hardening of the MTA was checked and the orthograde endodontic therapy was completed with the back-pack with Hot Shot (Sybron Endo, California, USA) and the coronal seal with glass-ionomer (Fuji IX, GC, Tokyo, Japan).

After 6 weeks, the micro-surgical endodontic therapy was performed in order to remove the endodontic material beyond the apex and regularize the shape of the apex. After having anesthetized the area with local anesthesia, using a solution of adrenaline mepivacaine + sol. 1:100000, and maintained haemostasis with a solution of mepivacaine + epinephrine 1:50000, a sulcular incision extended to 1.2



Figure 1 Initial clinical condition: 1.1 shows a severe fracture because of a dental trauma that occurred 3 month before.



Figure 2 Initial peri-apical X-ray.

and 2.1 was made. Distally to 1.2 a releasing incision was performed and a full-thickness flap was raised up to highlight the granulomatous tissue placed apically to 1.1.

Once the lesion and the endodontic material were removed, we debrided with care the resulting bony-crypt. At this point, thanks to the orthograde canal obturation with MTA, it was sufficient to regularize the shape of the apex with tungsten carbide multi-blades bur (Fig. 4). The soft tissues were repositioned with the aid of a synthetic monofilament suture (Tevdek 6/0), which was removed after 4 days.

The clinical and radiographic control carried out after 3 months showed an initial bone remineralization and healed soft tissues, thus justifying the completion of therapy with direct composite restoration. In order to highlight and expose the cervical fracture margin, thus allowing a proper isolation of the operative field and get a peripheral seal on the enamel, a second full-thickness flap was necessary (Fig. 5). It was then isolated with a rubber dam, the glass-ionomer was removed and the enamel margins were finished

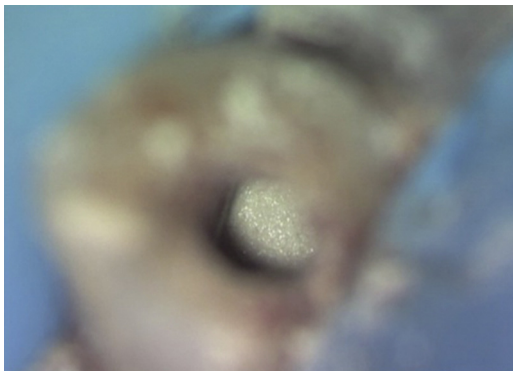


Figure 3 MTA apical plug.

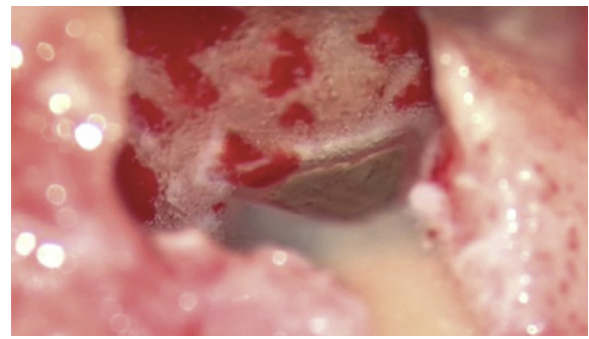


Figure 4 Apex shape at the end of the endodontic surgery with MTA apical seal.



Figure 5 Full-thickness flap to expose cervical margins of the fracture.

with a medium grit disc (Sof-Lex XT, 3 M ESPE, St. Paul, USA) in order to remove the not supported enamel prisms (Fig. 6).

The adhesive system, a 3-step etch-and-rinse (Optibond FL, Kerr, Bioggio, Switzerland), was applied as follow: etching with 36% phosphoric acid (Ultradent, Salt Lake City, USA) for 40 s on enamel and 15 seconds on dentin; rinsing with water spray for 30 s and air-drying; multi-layer application of the primer; multi-layer application of the bonding; curing with LED lamp (Valo, Ultradent) for 20 s. The direct restoration was performed using an incremental layering technique. The composite resin (Clearfil ES-2, Kuraray) was applied stratifying the masses starting from the buccal surface. For this step, the use of a silicone guide obtained from a diagnostic wax was fundamental as a guide either for the reconstruction morphology either as a support, while the interproximal walls were realized thanks to acetate matrix.

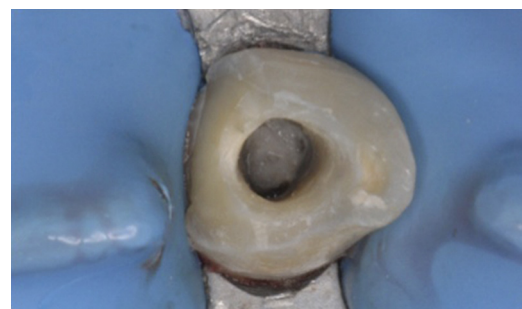


Figure 6 After rubber dam positioning, the fourth class cavity was cleaned and finished.

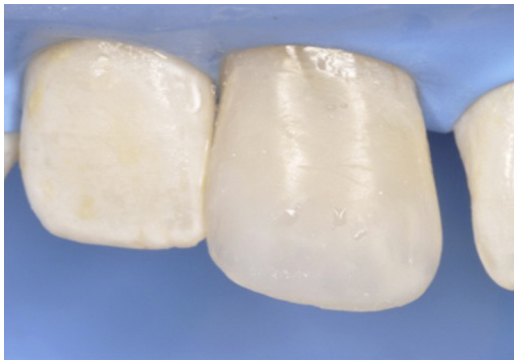


Figure 7 Direct composite restoration once finished and polished.

Afterwards the dentin mass was stratified on the composite buccal wall and, finally, a translucent composite for applied as final layer of the vestibular surface (Fig. 7). Once the restoration was finished and polished, the rubber dam was removed and the soft tissues were repositioned with a synthetic monofilament suture.

After one week the sutures were removed and finishing and polishing procedures were completed with a fine-grit diamond bur (Komet, Lemgo, Germany), medium-grain disks (Sof Lex XT 3 M ESPE), silicone points (PoGo, Dentsply De Trey GmbH, Konstanz) and self-polishing brushes (Occlubrush, Kerr Dental Corporation, Bioggio, Switzerland).

Results

The X-ray control after 12 months (Fig. 8) showed an effective coronal seal and complete bone healing. At clinical examination, the composite restoration showed a good integration, both aesthetic and functional, with the remaining



Figure 8 After 12 month coronal seal is still effective and periradicular bone appear healed.



Figure 9 Clinical exam after 12 month: the composite restoration shows good functional and aesthetical integration.

tissues (Fig. 9). The periodontal tissues also appear healthy, showing no residual scars to surgical procedures, which were performed to allow functional recovery of the tooth.

Discussion

The dental trauma is an accidental event that brings the clinician to act promptly with high-level therapies in order to guarantee a durable rehabilitation. Then, above all when the patient is a child, the direct composite restorations are considered the ideal or rather the mandatory therapeutic choice for the rehabilitation of a traumatized anterior tooth. This type of restoration is typically used for aesthetic restorations in small or medium cavities.

The main advantage of a direct composite restoration of a traumatized anterior tooth is the minimally invasiveness: the cavity preparation is almost absent and it saves the most sound hard tissue as possible, thus allowing re-intervention without a great sacrifice of additional tissue. That is why the above technique is considered the gold standard for the rehabilitation of an anterior tooth in a young patient. The concept of reversibility led to consider the direct composite restoration as the first choice rehabilitation.

Direct techniques, in addition, could be completed in one appointment, ensuring the patient a fast result both aesthetically and functionally. Moreover, in case of endodontically treated teeth, the possibility to quickly obtain a hermetic coronal seal could also significantly influences the success of the endodontic therapy itself.⁷

In the present clinical case, the initial endodontic condition was definitely tied to a wrong choice in the root canal treatment technique previously performed. In the case of large apices, is amply demonstrated that the gutta-percha is not able to create a hermetic apical seal,⁸ fundamental to avoid the onset of periapical disease. In these conditions, it was obviously necessary to perform a first orthograde approach, in order to remove the endodontic material used previously and disinfect the root canal, and subsequently a retrograde approach, in order to remove the over-apex endodontic material and regularize the shape of the apex to ensure a clinical condition more inclined to healing.

Conclusion

The 12-month follow-up visit showed that the combined orthograde-retrograde endodontic approach and subsequent direct composite restoration created ideal conditions for

obtaining a complete healing of both hard tissue and soft tissue.

Conflict of interest

The authors have no conflict of interests to declare.

References

1. Andersson L. Epidemiology of traumatic dental injuries. *J Endod* 2013;**39**(3 Suppl.):S2–5.
2. Diangelis AJ, Andreasen JO, Ebeleseder KA, Kenny DJ, Trope M, Sigurdsson A, et al. International Association of Dental Traumatology, International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 1. Fractures and luxations of permanent teeth. *Dent Traumatol* 2012 Feb;**28**(1):2–12.
3. Andersson L, Andreasen JO, Day P, Heithersay G, Trope M, Diangelis AJ, et al. International Association of Dental Traumatology, International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. *Dent Traumatol* 2012 Apr;**28**(2):88–96.
4. Stojanac I, Ramic B, Premovic M, Drobac M, Petrovic L. Crown reattachment with complicated chisel-type fracture using fiber-reinforced post. *Dent Traumatol* 2013;**29**(6):479–82.
5. Vital 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**(3):172–7.
6. Sjögren U, Figdor D, Persson S, Sundqvist G. Influence of infection at the time of root filling on the outcome of endodontic treatment of teeth with apical periodontitis. *Int Endod J* 1997;**30**(5):297–306.
7. Hachmeister DR, Schindler WG, Walker 3rd WA, Thomas DD. The sealing ability and retention characteristics of mineral trioxide aggregate in a model of apexification. *J Endod* 2002;**28**(5):386–90.