Update on aesthetic coronoradicular reconstructions of posterior teeth

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Abstract

The restoration of teeth treated endodontically and having undergone significant loss of substance remains a challenge for dental surgeons. It represents one of the most frequent clinical sequences of general practice on a daily basis.

This act is so common and so repetitive that the practitioner often performs it automatically, almost reflexively, applying the same mode of restoration to most clinical situations.

Metal coronoradicular restorations (RCR) have long been considered the standard for restoring depulpatated posterior teeth, as this type of restorations offer increased mechanical resistance to the occlusal stresses to which posterior teeth are subjected.

The advent of adhesive dentistry has revolutionized the restoration of depulpatated posterior teeth. It has become possible today to combine aesthetics, mechanical resistance and biocompatibility thanks to the fiber-based coronoradicular restoration of the posterior sector.

In this article, we will detail the clinical protocol for an esthetic restoration of two premolars treated endodontically and severely damaged.

Keywords: Fiber posts; Bonding; Aesthetics; Coronoradicular reconstruction

1. Introduction

The reconstruction of depulpatated teeth is a real challenge in daily practice. Indeed, the principles of tissue economy, modern techniques of endodontic retreatment and bonding allow us to push ever further the limits of conservation of the depulpatated tooth [15].

Performing a pre-prosthetic coronary radicular reconstruction is an essential act of prosthetic restoration. Indeed, we give this type of restoration a difficult role in restoring the loss of substance, in maintaining the canal seal, in mechanically reliable and stable connection between the dental organ and the prosthetic superstructure [1, 11].

Today, faced with increasingly high aesthetic requirements, the dental surgeon has to review his clinical method. It has become essential to complete the existing therapeutic range with adhesive reconstitutions, in order to ensure good biomechanical conditions and to offer the patient the desirable aesthetic result [3].
Coronoradicular restorations bonded with fiber posts are now recognized as an excellent alternative to coronoradicular restorations using cast metal posts. Their success is directly linked to the advantages of so-called "adhesive" dentistry that is biologically compatible, less mutilating and which allows rehabilitations of high aesthetic quality [20].

2. Overview of coronoradicular reconstitutions of the posterior teeth

2.1. Fiber posts

Fiber reinforced composite posts (fig. 1), or fiber posts, are an alternative to traditional cast or prefabricated metal posts. They were introduced in the 1990s and became popular with the advent of adhesive techniques, which changed the way of restoring endodontically treated teeth [10]. Compared to cast posts, fiber posts have mechanical properties similar to those of dentin and can distribute stresses to the root more evenly, thereby reducing the risk of root fracture (Fig. 2). In addition, fiber posts are aesthetic, practical and removable in the context of root canal retreatment. However, they can also increase the stress concentration in the cervical dentin as well as at the edge of the restoration [18, 6].

![Figure 1](image1.jpg) Different shapes of Quartz fiber posts [16]

![Figure 2](image2.jpg) Comparison of the stress distribution between a natural tooth (a), a fiber-reinforced CPR (b) and a metallic inlay core (c) [7]

2.2. Strapping

Generally, strapping is the most important clinical factor for the mechanical resistance of the endodontically treated tooth. The presence of adequate cerclage decreases the impact of coronoradicular restoration, bonding agents and the final restoration on the durability of endodontically restored teeth. Teeth prepared with cerclage tend to fracture more favorably if they fail. The proposed effective strapping height ranges from 1.5mm to 2mm [13, 14]. Resistance appears to increase considerably with increased cerclage height, and a better prognosis is to be expected if the cerclage is uniform (Fig. 3).

![Figure 3](image3.jpg) Different strapping configurations [4]

However, according to some authors, non-uniform cerclage still considerably increases the fracture resistance of the restored tooth.
3. Clinical procedures

3.1. Presentation of the case

A 40-year-old patient consulted for the replacement of the missing 26. Clinical examination revealed satisfactory hygiene, subtotal but supragingival decay of all the walls at the level of 24 and 25 (fig. 4).

On radiological examination, the periodontal and endodontic environment were favorable for coronoradicular restoration. Our prosthetic decision focused on a ceramic-metal bridge replacing the 26 and having 24, 25 and 27 as supporting teeth.

In this article, we will focus on the reconstruction of 24 and 25 for which we have opted for fiber-bonded coronoradicular restoration.

3.2. Root canal preparation

The coronal portion having been cleared of altered tissues and obturation residues, the passage of a series of Largo drills of increasing diameter eliminates most of the endodontic filling material, and begins the canal preparation which will receive the post. (fig. 5). The length of the root canal preparation must be adapted to the anatomy of the tooth in question, while taking into account the additional retention provided by the bonding of the reconstruction, making it possible to reduce its depth to limits much less than the root two-thirds recommended for metal posts [8].

3.3. Adhesive procedures and post bonding

Figure 4 Initial view of 24 and 25

Figure 5 Root canal preparation to receive the posts

Figure 6 Try-in of the posts
The try-in of fiber posts in root canal preparations initiated this bonding step (fig. 6). Once adapted, these posts were coated with an adhesive and then light-cured (fig. 7.a, b). The same procedure was applied to the post seats (fig. 8.a, b). We have selected a dual adhesive system which has a specific micro-applicator to obtain a quality hybrid layer [5].

![Figure 7](image1.png)
**Figure 7** a: application of the adhesive in the canal / b: light-curing

![Figure 8](image2.png)
**Figure 8** a: application of the adhesive to the post / b: light-curing

The application of the dual resin at the root canal level, the placement of the post and its photopolymerization (fig. 9.a, b, c) completed this bonding step. The resin must fill the spaces and coat the post in order to absorb and distribute, thanks to a modulus of elasticity close to that of dentin, the forces applied to it. Finally, thanks to its bonding capacity with the adhesive, it contributes to the cohesion of the whole [9]. It was injected into the housing to fill it completely, without the risk of leaving empty spaces.

![Figure 9](image3.png)
**Figure 9** a: Application of the Dual resin, b: placement of the post, c: light-curing

Coronary reconstitution (fig. 10) is carried out at the same time with the same material in order to obtain a homogeneous whole and to avoid the multiplication of interfaces [12] (between the coronal reconstitution composite and the root composite) at the origin of weakening of the core. all. These stumps were protected by two temporary crowns (fig. 11).
3.4. Prosthetic realization

An impression of the dental preparations and the entire arch was made using addition silicones (Fig. 12.a, b). This impression allowed a faithful transfer of the clinical situation to the prosthesis laboratory.

Upon receipt of the metal framework, a try-in was carried out in the mouth (fig. 13) in order to check the adaptation, retention and stability of the bridge, as well as the space left for the veneering ceramic. When this was fitted, a new try-in was carried out (fig. 14) in order to check the points of contact, the occlusion and the aesthetic integration in the mouth.
The final aesthetic rendering was judged after glazing the ceramic. The result was satisfactory in the eyes of the patient and the entire healthcare team (Fig. 15).

Figure 14 Installation of the veneer ceramic

Figure 15 Final aesthetic result

4. Conclusion

Although the performance of coronoradicular restoration is a daily and repetitive act, it can however, by the presence of the root posts, constitute a real danger for the durability of the tooth. In order to limit the risks, it is imperative to strive for maximum tissue savings, both in terms of coronary preparations and canal housings, in order to maintain thicknesses capable of withstanding excessive occlusal stresses at the posterior level, and to select materials of reconstruction and junction capable of respecting the physiology of the depulpated posterior tooth [19, 17].

Bonded coronoradicular restoration now seem to be an excellent alternative to cast metal ones in terms of mechanics, aesthetics and biocompatibility.

However, this alternative requires on the one hand a good mastery of root canal preparation techniques which must offer greater tissue economy, and on the other hand a good mastery of bonding techniques adapted to the material chosen, in order to limit failures by unsealing of the restoration [3].

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest.

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