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Use of customized fiber posts for the aesthetic treatment of severely compromised teeth: a case report

CASE REPORT

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Abstract – The introduction of fiber posts has improved the treatment of endodontically treated teeth, increasing retention, and distributing the stress along the root in order to reduce the risk of fracture.This clinical case describes the use of posts during the prosthetic rehabilitation of severely compromised teeth in the anterior segment.

The introduction of fiber posts has made a great impact on the restoration of endodontically treated teeth. Since their introduction (1–3), technology had modified and further improved fiber post shape and materials; in addition, the use of innovative adhesive systems and cementation techniques has offered the possibility to achieve high level of adhesion within the root canal (5–8), producing new posts which ensure dental tissue conservation (4). This clinical case describes the use of posts during the prosthetic rehabilitation of severely compromised teeth in the anterior segment.

Case report

A 30-year-old female patient consulted our dental clinic for the rehabilitation of the anterior superior segment (Fig. 1), which had been traumatised 10 years before our first clinical examination. Both 21 and 22 had lost pulp vitality.

The initial clinical examination revealed dental caries of 11-21-22. In particular, 21 and 22 had changed color showing that they had already been endodontically treated.

Once a careful excavation of caries had been performed by hand, it was observed that the remaining radicular canal walls were extremely thin (Figs 2 and 3).

Root canal therapy of 21 and 22 was then repeated and both the teeth were treated with a bleaching solution (Opalescence Endo; Ultradent Italia, Corsico, Milano, Italy) to eliminate discoloration (Fig. 4).

A root canal impression using polyethers was performed in order to fabricate customized fiber posts, avoiding any further removal of dental tissue.

These posts were created using siliceous fiber posts (Tech 21 Xop, Isasan Srl, Rovello Porro-Como, Italy) that were covered with a layer of composite resin (Enamel Plus; Micerium SPA, Avegno-Genova, Italy) (Figs 5 and 6).

Once the post insertion in root canals had been verified, roots were prepared for adhesive cementation (Figs 7 and 8). The root canal walls were etched with 32% phosphoric acid for 15 s, washed with water syringe and gently air-dried. Excess water was removed from the post space using paper points. Two steps adhesive

Fig. 1. Pre-operative view: teeth discoloration and consequent aesthetic problem are evident.

Fig. 2. Occlusal view after excavation of caries.

Fig. 3. X-ray examination shows the remaining thin root wall after the endodontic treatment.

Fig. 4. Tooth color after bleaching.

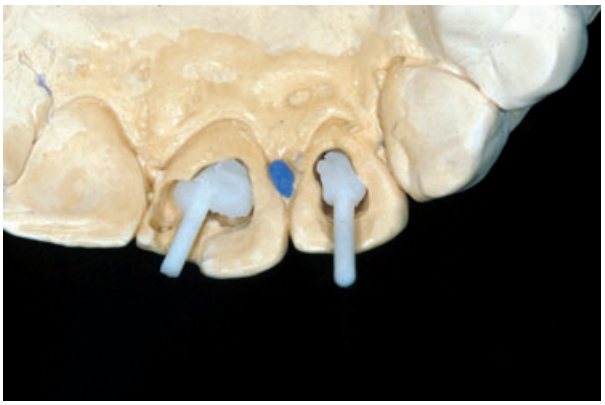

Fig. 5. Customized fiber posts were inserted on the plaster model.

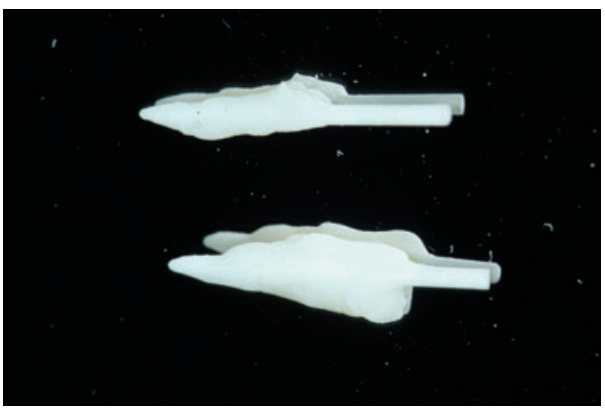

Fig. 6. Customized fiber posts.

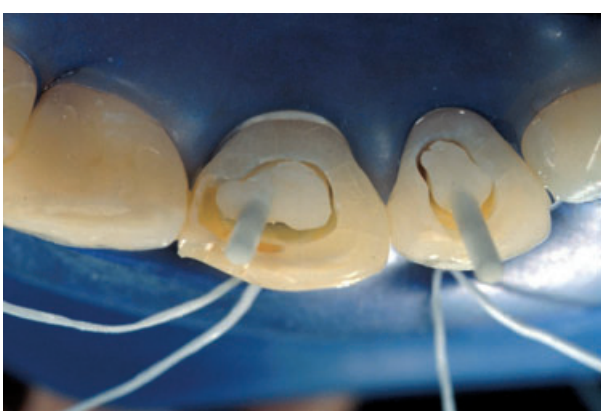

Fig. 7. Fitting of the posts.

component (Adper Scotchbond Multipurpose, 3M, Italia, San Felice-Segrate, Milano, Italy) was applied to the root canals according to the manufacturer's instructions and then light-cured for 20 s.

Dual-cure resin cement (Relyx ARC 3M, Italia, San Felice-Segrate, Milano, Italy) was then applied and the posts were inserted. Excess material was removed before light-curing for 40 s.

Fig. 8. Careful cleaning of the canal root before post-cementation.

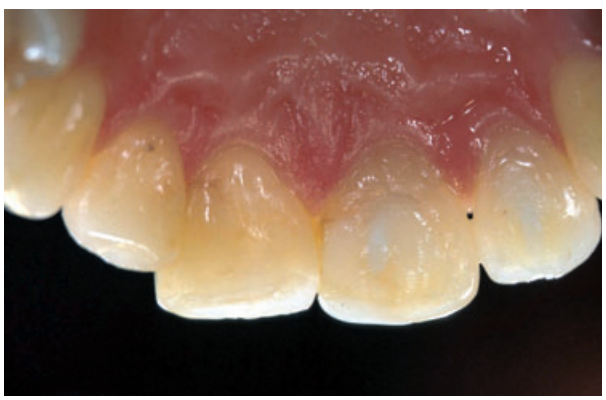

Fig. 9. Post-positioning.

Fig. 10. Wax up.

Fig. 11. Planning of teeth preparations according to wax up.

Fig. 12. Central incisor preparation: a detail.

Fig. 13. Tooth preparation was completed.

Adhesive cementation of the posts was completed (Fig. 9) and a diagnostic wax-up was then performed (Fig. 10). Using this wax-up, ceramic crown preparations of 11-21-22 were realized; a composite veneer restoration was subsequently planned for 12 without any dental preparation (Figs 11–13).

A polyether impression was then performed and the integral ceramic crowns were realized for 11-21-22 as well as a composite veneer restoration for 12 (Figs 14–15). Prosthetic restoration cementation was performed with a rubber-dam, using the same adhesive system used for the fiber post cementation (Fig. 16).

The final view of the anterior segment shows a good aesthetic result (Fig. 17) with a successful adaptation of the customized post in the root canals at the radiographical examination (Fig. 18).

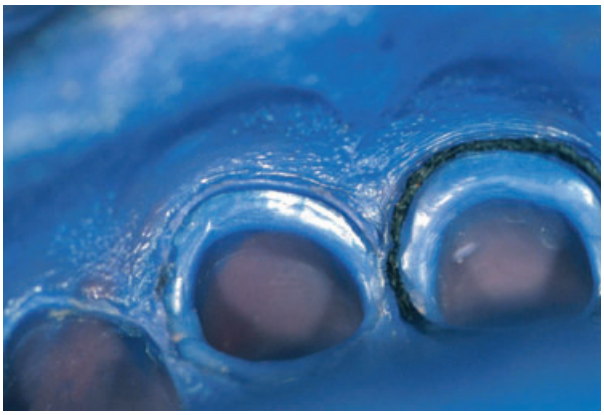

Fig. 14. Impression.

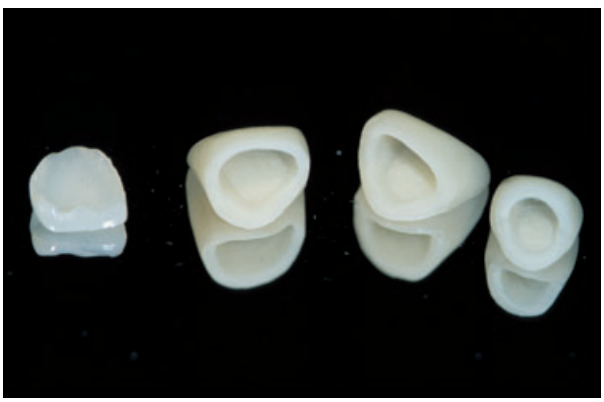

Fig. 15. Prosthetic elements ready to be accommodated.

Fig. 16. Adhesive cementation of the post was performed after rubber dam placement.

Fig. 17. Final view of the case.

Fig. 18. Post-operative X-ray examination.

Discussion

A significant improvement in fiber post adaptation and retention can be achieved with the 'customized post' (8–10). A layer of composite resin is applied to the post surface, to create the precise shape of the root canal without the need for further dentine removal. In this way, the fiber post reproduces the root canal morphology of the tooth which needs prosthetic restoration.

Since the anatomical post fits the root canal shape perfectly, a thin and uniform layer of resin cement is simply required. This layer of cement creates a higher level of uniformity in the distribution of occlusal forces transmitted to the tooth, reduces the effect of polymerization contraction of the resin material as well as the number and dimension of bubbles within the cement itself (4).

It is important to remember that a conservative approach should be planned for the residual tissue to achieve clinical success of the prosthetic restoration (7–12). In the case described the prognosis of the severely damaged teeth, whilst still uncertain, has been improved thanks to the use of fiber posts and self-adhesive resin

cement, increasing post retention and reinforcing the teeth structure. Careful and regular follow-up is needed in order to evaluate the long-term prognosis of the restored elements.

Conclusions

From a clinical point of view, the introduction of customized fiber posts allows the adhesive system to be used even when the commercial posts do not perfectly fit the root canal shape. In particular, where the root canal shape is modified as a result of the endodontic treatment and the residual root tissue is thin, the complete adhesive technique contributes to achieve a homogeneous restoration (post-root-prosthetic restoration) that should increase the resistance of residual dental tissues.

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