Non-vital teeth – a challenge for prosthodontic management

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ABSTRACT

The aim of this paper is to show the use of an individual prepared cast post and core on destroyed dental crowns, which after the endodontic treatment serve as non-vital teeth in fixed prosthetic reconstruction. As material we used examined group of twenty patients from our current practice characterized by strong destruction of dental crowns. After undergone clinical examination and Rtg status, we came to a conclusion that at those teeth, there is an indication for an endodontic treatment. Afterwards, upon preservation of biological recovery of endodontic treatment, non-vital teeth were used for manufacturing cast post and core. Then we have made metal-ceramic crowns which have repaired the defect in the teeth row. Our patients were supervised 6 months (with clinical examination and Rtg status). After the observational period of six months there is not registered wearing off, dislocation of the construction, root fracture or secondary caries. From this supervised cases, we can conclude that each destroyed tooth that can be endodontically treated, and then used in prosthodontics practice, should inevitably be treated and preserved.

Keywords: destroyed crown, non-vital teeth, cast post and core, crown, abrasio

1. INTRODUCTION

The number of endodontic procedures has grown exponentially in recent decades. These treatments proceed more rapidly with highly predictable results. Therefore, the dental restoration is affirmed as integral part of fixed prosthetic practice in the dentistry after the endodontic treatment. By using the fixed prosthetic reconstruction of endodontic treated teeth, with partial or complete loss of clinical crown, can be established the lost continuity of teeth row, transmission of masticatory pressure, preservation of alveolar bone, occlusal ratio, the periodontal receptor function, as well as aesthetics [1]. At first, the fixed prosthetic reconstruction begins with making a cast - post and core in the dental root canal in order to ensure secure connection with the leftover hard dental tissue. Thus, this provides a proper stress distribution among the tooth, the cast post and core, and the fixed prosthetic construction [2].

The modulus of elasticity of material from which is made the cast post and core, are responsible for smooth stress transmission through the entire dentin. It is therefore important that material to have similar module as the dentin. It can be also rather useful the system, cast post and core - crown, to be made up of material with a similar module of elasticity in order
to provide a smooth transfer of masticatory forces to the leftover solid dental substance after the restoration [3]. The longevity of post and core restoration depends on the amount of the leftover hard dental tissue after the endodontic treatment, method of its cementation, and on its shape and thickness. The bigger the leftover hard dental tissue and the thicker root walls, the greater the continuity of the restoration.

It appears that the individual made cast posts and cores adapt well to the root canal walls. Due to the high level of retention, the formation of a tooth abutment and the better geometric adaptation for the leftover dental structure, a great number of dentists prefer still to use the cast post and core [4]. In the present paper, the use of an individual prepared cast post and core on destroyed dental crowns, which after the endodontic treatment serve as non-vital teeth in fixed prosthetic reconstruction, is reported [5]

2. MATERIALS AND METHODS

Twenty patients were included in this study. All patients were divided into four groups and were treated at the Clinic of Fixed Dental Prosthetics in Skopje, R.Macedonia. In the first group (Figure 1), five patients shown similar indication for the fixed prosthetic construction. In fact, these were patients with more teeth in the jaw, but with damaged and abrasive crowns. After the endodontic treatment, we set up a cast post and core there where it was required. Afterward, the fixed prosthetic construction was performed on it.

In the second group (Figure 2), the satisfaction from therapeutic success was immensely, since it comes down for patients with terminal unilateral edentulous, in whose areas only abraded or destroyed teeth or teeth roots were presented. After indication for endodontic treatment, preservation of biological recovery, a cast posts and cores were made and over them a fixed prosthetic construction was performed.

The third group of patients (Figure 3) was numerous. The one of four incisors was fractured in these patients. We set up a cast post and core where it was only required, and then a fixed prosthetic construction was performed.

In the fourth group (Figure 4) were included patients, whose frontal teeth were most abraded or destroyed. In some of them, a cast post and core and then crown were made to all four incisors. In the others, there was a chance to made one or two cast posts and cores and no need to intervene in the others incisors. But, we performed always a fixed prosthetic construction to all incisors.

3. RESULTS AND DISCUSSION

Our patients were examined for 6 months and followed with regular control examinations (clinical findings and Rtg status) in which it was not registered a root fracture, a secondary caries, wearing off or dislocation of the construction. The patients responded well to the fixed prosthetics constructions, accepting them as an integral part of their own teeth. Taken on the whole, they meet their aesthetic - phonetic criteria and compensated the lost masticatory effect of teeth deficiency as well.

The significant loss of tooth substance and rigidity of endodontic treated teeth imposes the need for their strengthening and stabilization through making of a cast post and core. In that manner, retention and protective function of the leftover tooth structure should be provided at the same time. By destroyed teeth, the cast post and core provides the proper transmission and distribution of the occlusal forces to the leftover tooth and periodontal tissue, providing proper guidance of direct occlusal lateral forces towards the apex from the tooth root.

It has sometimes considered the post and core should primarily be used for strengthening non-vital teeth, because they become non-elastic and rigid for a time due to the water loss and the chemical changes in organic and inorganic matrix of the dentine. It has also believed that by tooth strengthening with a cast post and core significantly affects the function and the prognosis for the longevity of the fixed prosthetic construction. These assumptions have been tested several times throughout the past. A similar observation was conducted through this clinical study in our practice. We confirmed unambiguously the conclusion that the cast post and core provides retention of the fixed prosthetic construction. That construction through the contact with the adjacent teeth and antagonists with the reintegration in the masticatory process of the respective tooth, indirectly affects tooth strengthening and periodontal tissue. Despite the position for preventive stabilization and strengthening of the fragile leftover root structure by simply applying post in the root canal.

It is sometimes indicated to be performed endodontic therapy at first to the teeth with a strong destroyed tooth crown. Such, endodontic treated (non-vital) tooth should be soon restored with a view-
Figure 1. Patient from the first group of respondents, a. before prosthetic treatment b. Rtg status c. prepared cast post and core d. permanently cemented fixed prosthetic construction

Figure 2. Patient from the second group of respondents, a. prepared and cemented cast post and core b. permanently cemented fixed prosthetic construction

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Figure 3. Patient from the third group of respondents, a. before prosthetic treatment b. prepared cast post and core c. permanently cemented crown

Figure 4. Patient from the fourth group of respondents, a. before prosthetic treatment, b. cemented cast posts and cores, c. permanently cemented fixed prosthetic construction
to prevent the coronary micropermeability that could lead to compromition of the endodontic treatment. If the leftover of the tooth crown is strongly destroyed and is insufficient for a reconstruction with composite materials, or serve as a retention of the fixed prosthetic construction, it is necessary in the root canal to incorporate a cast post and core (root part) and thus to allow adequate retention for a reconstruction of destroyed tooth crowns [6,7].

Indication for the use of a cast post and core is pulpless teeth in which lack partially or completely the crown, and therefore, there is a need for preprosthetic tooth strengthening. Whereas, a relative contraindication is the loss of interarch space i.e. a reduced occlusal vertical dimension. In that case, the use of a cast post and core is justified only at the time of complete reconstruction of the bite or its elevation in the vertical occlusal plane [8]. The periodontal compromised teeth that have a degree of luxation I and II, are also relative contraindication, while dental with degree of luxation III and IV are absolute contraindication [9]. Three conditions are necessary to be completed in order to provide efficient making of a cast post and core: prosthetic, endodontic and periodontal condition. At the beginning, it is necessary to consider several things, before to decide on making of fixed prosthetic construction with previous conducted incorporation of a cast post and core [10]. These includes: the amount of the leftover tooth crowns, the root morphology, the quality of root fillings, the state of periodontal tissue, the position of the tooth in the teeth row, the magnitude of the occlusal load, whether the tooth be abutment of a crown, a bridge or a partial dentures, as well as the aesthetic point [11].

The cast posts and cores applied in the transcanine region achieved the expected results (strength, adequate retention, tooth structure strengthening) for this region. Thus, the point of interest of our clinical study is the behavior of the cast posts and cores applied in the intercanine sector, a sector that is visible and particularly important for the patient aesthetic. The frontal fixed prosthetic constructions were adequately prepared, providing all of the prosthetic principles, which result with an aesthetic reconstruction of the teeth at the end.

4. CONCLUSION

The proper diagnosis and the indication, the effective selection of the annex type and the correct application in the root canal, provide safety and longevity of the fixed prosthetic construction of endodontic treated tooth. The cast post and core must ensure long-term retention of the crown or the bridge, and to provide a proper loading transfer of the entire root and the surrounding tissue. From the follow-up cases, we can conclude that each destroyed tooth that can be endodontic treated, and then used in prosthodontics practice, should inevitably be treated and preserved.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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References

