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Richmond crown on four anterior teeth with 1/3 cervical fractures

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Abstract
Introduction: Loss of the tooth structure of four anterior teeth simultaneously is rare, remains less of structure. Restoration with Intracanal retention is an appropriate to support these condition in restoring the function and esthetic appearance. Case: A Male patient, 24-year old, came to department of endodontic, Faculty of Dentistry Hasanuddin University hospital with fractures of four anterior teeth 12,21,11,12 which remain 1/3 cervical with diagnosis of chronic apical periodontitis. Treatment: Conventional endodontic treatment using Crown Down Preparation technique is performed then obturate with single cone technique and restore with Richmond crown. Conclusion: Fractures teeth with less remained tooth structure can be restored with Richmond crown to provide maximal retention where the post, core and crown in one block system.

Key word: Richmond crown, teeth fractures, post crown

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INTRODUCTION

Dental trauma is most common in the 7 to 12 year-old age group and the cause is mainly due to falls and accidents near home or school. Most dental trauma occurs in the anterior region of the oral cavity, affecting the maxillary more than the mandibular jaw. Can occur to one or more teeth, but the incidence on multiple teeth is very rare. One of the most common dental trauma types is crown fracture. When half or almost all of the structure of the crown is lost, of course, it is not possible to obtain sufficient retention of the remaining dentine structure. In these conditions, the root canal retention needed to support the final restoration and fracture resistance. In the posterior teeth do not always need post-retained core due to sufficient dentin bulk and receive load axially. Because of anterior teeth which receive load nonaxially, more stress develops when chewing forces exerted. Thus, post and core procedure has been advocated to get retention for the final restoration.

There are two types of posts that used, prefabricated posts and custom posts, which the posts selection depends on the remaining structure of the tooth crown. Custom posts is better used if less of the crown structure remain or there is no clinical crown, so it needs protection against fracture with a ferrule or metal collar effect covering around the root surface.

Richmond crown is a restoration with custom posts, which brings post and core together become a unit. Providing a better geometric adaptation to the flare or elliptical shaped root canal. Indicated to teeth that have less crown structure remains and lack occlusal clearance.

CASE REPORT

A male patient aged 21 years old came to the Unhas Dental Hospital, with chief complaint one third cervical fracture of 4 anterior teeth. Fractures occurred one year ago as a result of trauma. Objective examination obtained fracture with less remaining crown structures, deep-bite occlusion, and short size teeth (Fig 1). Thermal test does not give respond, tenderness to percussion test. On radiograph image showed normal root with apical radiolucency (Fig 2). The diagnosis is chronic apical periodontitis.
CASE MANAGEMENT

Root canal preparation performed on #11, #12, #21, #22 with crown-down preparation technique using ProTaper files to file F5 (Dentsply Maillefer, Switzerland). Dressing of Ca(OH)2 and temporary restoration given. A week later the root canal filling performed with single cone technique with Gutta-percha sizes F5 (Dentsply Maillefer, Switzerland) with the root canal resin cement AH 26 (De Trey Dentsply Germany), temporary restoration given. In next appointment, post space prepared was prepared using peeso reamer no. 1-4 (Mani, Japan), preparation of crown structure, shade selection, rubber base impression made (inc GC, Japan), then given a temporary crown. On the next visit try-in and Richmond crown was cemented with glassionomer (GC Corporation Tokyo, Japan).

DISCUSSION

Teeth are in a challenging environment, facing heavy and repeated occlusal loads more than 1 million rounds per year, throughout its life. Anterior teeth with structural damage or loss of extensive dental crown (trauma, extensive proximal caries), need a core that uses posts in the root canal to hold the core and the final restoration.

The main changes in the biomechanical properties associated with dental tissue loss due to caries, fractures, restorative procedures, occlusal wear increasing the risk on teeth during normal functioning. Teeth that had endodontic treatment performed are at greater risk than vital teeth, so the selection of restoration must meet the criteria of: 1) protecting the remaining tooth structure, 2) minimizing cuspal plexure, 3) providing crown seal to achieve satisfying function and esthetics. The need of posts core and posts are vary depending on the size and load that tooth received. If the tooth crown much still remains, the core material choice is not important, but it becomes very important when only a less of the crown structure remains. Core that made of composite resin, glassionomer, and cermet would be a risky option.

There are some types of posts that could be an option. This indicates that there are no posts that can meet all the criteria of ideal posts, so that the selection depends on the condition of the tooth crown structure. When sufficient amount of tissue is present at periphery of the root prepared tooth, a direct pontion restoration is indicated, which is a prefabricated post is cemented inside of the root canal and the core is built directly on the prepared tooth. But when less of tooth crown structure is remains, it is an indication to use the custom post. The risk of root fracture based on tensile stress of the tooth.
structures was higher with the post and core composite than with custom post and core, these stresses doubled when the restoration were not bonded the tooth structures. The advantages of custom post and core system is that the post and core is united, and that the core does not depend on mechanical factor for retention on the post. This construction prevents the separation of the core from the post and root canal when less tooth structure remains. Post and core form is in accordance with the shape of the root canal and the remaining tissue structures so that would minimize dentin tissue loss, both on the root canal and the crown. While the prefabricated post must remove the tissue to follow the available posts shape.

If there is a ferrule, custom posts can provide more high resistance to fracure than the prefabricated posts that made of metal or carbon and core made of composite. Presence of ferrule is determining factor on the strain, stress distribution, fracture resistance and failure mode. A uniform 2 mm ferrule were more fracture resistance than those with a uniform 1 mm ferrule in endodontically treated maxillary central incisor. In the absence of ferrule the use of fiber glass post represents conservative choice because of the non-catastrophic fracture pattern was observed. When a custom post and core are used, the post should be as long as possible, whereas the biomechanical performance of fiber glass post was less sensitive to post length.

Custom Post and cores fabricated using a standardised fabrication technique have a good long-term prognosis. Clinically longevity of the post and core restoration can be influenced by many factors including magnitude and direction of the occlusal load, design of dowel, thickness of the remaining dentin, quality of cement layer and creation of ferrule effect to enhanced structural durability of final restoration. Most common cause of failure is the loss of retention. Although there are also studies that claim there is no data supporting that custom post and core custom is better than prefabricated post or otherwise. Disadvantages of custom post and cores are more time consuming and frequently involves greater laboratory and material costs. So if the quality of treatment comparable, direct core restoration can reduced both time and financial burdens on the patient.

Various kinds of cement has been used for post cementation, such as the traditional cement, glassionomer cement, and resin cement. Traditional cement is zinc phosphate cement or polykarboxy late cement. This cement provides mechanical retention and does not have a mechanical bond to the posts and dentin. Clinically provides sufficient retention to the posts if the tooth structure is adequate. Some authors recommend glassionomer cement for custom post insertion as it can be manipulate easily, settings chemically, and is able to bind to both tooth structure and post.

In this case report, Richmond crown was decided to restore fractures involving 4 anterior teeth with less remaining crown structure, with deep bite occlusion and short tooth size. Richmond crown is a restoration that brings together the post and core in a unit. It is very appropriate in this case so that limited space problem for final restoration placement can be overcome by it. The crown that unite with the post has several advantages compared to the crown with several parts. When a separate post and core, posts can be bent due to functional load, causing pressure between the post and the core, resulting separation of the post and core. Caries or loss of the crown can cause core damage also damage to the core material after a while. Therefore, it needs a restoration that brings together post, core and crown in one unit for long term stability.

CONCLUSION

Tooth fracture with little remaining tooth structure and deep bite occlusion condition does not have sufficient space for the placement of restoration. Richmond crown may be an option in order to obtain maximum retention through a union between a post and core in one system. However, it has to be used judiciously according to tooth condition.

REFERENCES

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