

# Clinical study of GLASSIX plus radiopaque & light transmitting fiber post system in the restoration of anterior teeth defects

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Chinese Book Classification No.:R783.4

Literature Identification Code: A

Essay No. :1672-5085(2012)23-0033-02

[Abstract] Objective To evaluate the treatment outcome of the GLASSIX plus radiopaque & light transmitting fiber post system in anterior teeth restoration. Methods A total of 76 patients were included, involving 86 anterior teeth. After complete root canal therapy, the teeth were treated with GLASSIX plus radiopaque & light transmitting fiber post system. During the observation period of 12~24 months, Periodontal conditions, radiographic signs and prosthodontic results were recorded. Results One porcelain crown with post and core was lost, and post and core fracture clinically was observed in another case, the successful rate of the teeth restored with GLASSIX plus radiopaque & light transmitting fiber post system was 95%, there were no significant differences of gingival index (GI) between test and control teeth ( $P>0.05$ ). Conclusion GLASSIX plus radiopaque & light transmitting fiber post system can be used in the restoration of anterior teeth defects absolutely, and with the highly successful rate.

[Key words] Anterior teeth Fiber post Tooth defect

Currently, fiber post restoration is the major therapeutic method for large teeth defects. Selection of fiber post system is an important factor to determine the successful restoration of post crown<sup>[1]</sup>. If teeth root can be preserved for defects of anterior teeth, post crown restoration can be applied. The ideal material for fiber post should have high strength, be corrosion and fatigue resistant, with elastic modulus similar to teeth tissues, have good transparency, good appearance, and can be easily processed. With the gradual development of restoring materials, the materials have been transferred from metal materials to non metal materials, including post and core materials. The conventional metal post has characteristics including easy corrosion, hypersensitive toxicity, difficult dismantle, not good looking,

MRI scanning affected, etc. [2] Glass fiber post has a similar elastic modulus to dentine, which can prevent root rupture, and protect teeth tissues [3]. Fiber post and resin core will not release metal ions such as nickel ion, which may induce toxic or hypersensitive reactions, and they have better biocompatibility compared to metal post. Fiber post has good transparency and good appearance during all ceramic restoration, and the patients are highly satisfied [4]. Especially in aesthetic restoration of anterior teeth, fiber post has been extensively applied in clinics. During Oct. 2009 to Oct. 2011, patients with anterior teeth restored by using GLASSIX plus fiber post system were followed to observe its clinical effects.

## 1. Materials and methods

### 1.1 General materials

From Oct. 2009 to Oct. 2010, 76 patients including 32 males and 44 females aged 18-46 yrs were enrolled from Shenyang Maohua Dental Center, with 86 anterior teeth with external trauma or caries. All the affected teeth were treated by using post crown restoration, including 50 central incisors, 30 lateral incisors, and 6 canine teeth. Of all teeth, 76 were restored by using IP S Ema xPress all-ceramic crown, 12 were restored by using common porcelain complete veneer crown. All patients had good periodontal conditions, without active gingival or periodontal infections. The observation period was 12-24 months. All patients were treated by one doctor, and clinical examination was performed by another doctor.

### 1.2 Materials

Fiber post system: GLASSIX plus radiopaque & light transmitting spiral fixing fiber produced by Nordin, Switzerland.

Adhesive: RelyX Unicem Aplicap resin produced by 3M, USA.

### 1.3 Method

1.3.1 Canal preparation: remove thin wall weak dental cusp and detritus. Referring to X-ray film and diameter of canal, first use Pecho reamer (Mani, Japan) to remove filling materials and gutta percha point, then treat by premold and mold drills for GLASSIX plus fiber post from small to large bits, till canal diameter and length were achieved. The dental cusp should be left with 4 mm gutta percha point for apical closure.

1.3.2 Selection of fiber post: choose a fiber post with consistent size of the final mold drill during preparation.

1.3.3 Adhesion of fiber post and resin core mold: flush canal with 1% sodium hypochlorite and normal saline, dry the left water by using paper, RelyX Unicem Aplicap (3M, USA) was used to install the extension transporter into dental canal, and insert the fiber post, illuminate to mold the resin core.

1.3.4 Dental preparation, mold and crown adhesion: for double cord and single cord packing method, teeth were prepared according to dental preparation, silica rubber was used to make molds, bite records were made on silica rubber, ultra hard plaster mold was cast, and whole crown was prepared by the technician. The patient tried the mold, the technician adjusted and modified, and glued with resin.

#### **1.4 Clinical evaluation**

The clinically restored teeth were evaluated by reviewing the case, clinical examination and X-ray film. Clinical symptoms were combined to compare the X-ray films before and after treatment. The teeth were checked for loosening or falling off. Whether there was caries, periapical periodontitis, apical rupture, post rupture, etc. It was successful if no abnormality was found, or failed if there was any abnormality. Meanwhile, gingival index (GI) was observed and recorded with adjacent teeth of the affected teeth as referring teeth to evaluate the periodontal conditions, blunt periodontal probe was used to mildly probe the affected teeth, the gingival proximal, central, distal and tongue grooves on control facies labialis dentis, the hemorrhage was observed and scored (0-3), GI of determined tooth was the mean of the scores of 4 sites<sup>[5]</sup>. No antibiotics had been used before treatment and examination.

#### **1.5 Statistical method**

All obtained data were put into database. SPSS12.0 was used to treat the data. The two specimens were compared by using paired t test,  $\alpha=0.05$  as adopted as the significance level.

## 2. Results

(1) The sample size was relatively small, and it persuasive when sample size increased. (2) Restoring method applied in control group was not mentioned in materials and method, then how to get the results. (3) Open tables should be used.

This group included 35 patients with 43 affected teeth. During 12-24 months' observation period, 1 patient had post and core ruptured, another patient had post core fallen off. The rest prosthetic replacement were not observed loosening, translocation, falling off, X-ray film showed no apical abnormality, or root rupture. Alveolar ridge had no obvious change, and the successful rate was 95%. Except for 2 failed patients, 41 patients performing GI restoration had no statistical significance compared to control patients ( $P>0.05$ , table 1).

Table 1: GI results of fiber post restored teeth and control teeth\*

Groups	n	GI ( $\bar{x} \pm s$ )
Restroed teeth	41	0.62±0.35
Control teeth	41	0.59±0.33

\* $t=0.682$ ;  $P=0.499$

## 3. Discussion

Fiber post is a compound material, formed by embedding glass fiber post into epoxide resin by using special molding technique. GLASSIX plus is the latest fiber post, light transmitting fiber was used, with high light conductivity, high X-ray resistance (aluminum radiodensity 350%), spiral fixing groove was matched (high gradient spiral structure, increasing mechanical fixing strength and avoiding root rupture), with elasticity close to dentine, transverse strength 1500 Mpa, transparent luster and good aesthetics effects, 100% biocompatible glass fiber post, circular cylinder + conical shape matched canal well. This system has four patterns,  $\varnothing 1.2$ -  $\varnothing 0.6$ ,  $\varnothing 1.5$ -  $\varnothing 0.8$ ,  $\varnothing 1.8$ -  $\varnothing 0.9$ ,  $\varnothing 2.0$ -  $\varnothing 1.0$ , with diameters gradually increasing, and they can be easily recognized by the different colors. Supportive drill needles are matched, canal can be dilated by different needles, and it is unnecessary to erode normal dental body, and it is a microinvasive measure. The clinical operation is simple for resin core, core color

and shape can be easily adjusted, hardness of light cure core is close to dentine. It can be modified easily, which greatly shortens the time for clinical operation. While for conventional metal crown, the patient needs to come for 3 times at least, the operating procedure is complicated, quality control is difficult. GLASSIX plus fiber post can be easily removed by supportive engine bit, no secondary injuries will be induced for abutment tooth with fiber crown prepared when retreatment is necessary for canal treatment. And it is possible that the affected tooth can be restored for the second time.

In this study, 43 anterior teeth were chosen, and no significant abnormality was observed when prosthetic replacements for 41 affected teeth were reviewed. The aesthetic effects were satisfied, and the successful rate was 95%. Two patients were failed, 1 was fiber post rupture. The patient had lateral incisor on left upper mandible was restored, the left dental tissues of crown was not much before restoration, only a little dental tissues of lingual crown were left, the canal was relatively narrow, so the maximal fiber post was selected, but the patient had tight occlusion, and the post was ruptured after 11 months at tooth crown. The possible reasons: 1st, the selected fiber post is the smallest, the smaller the diameter, the smaller the bending strength; 2nd, no sufficient dentine is available, when the prosthetic replacement is bearing functional load, the mechanical strength decreases when fiber post is repeatedly stressed and curved, interface between post-dentine is also affected. However, because mechanical strength of fiber post drops more quickly compared to adhesive strength, and the occlusion is tight, so the fiber post finally breaks.

Another patient has fiber post core fallen off, and it is a failed restoration of central incisor cast post. When the original cast post was removed, the canal was dilated to a bellmouth shape, the rest dental tissues was aligned with gingival, the effective length of tooth root was relatively short, and the crown post fell off within 1 month. The reason for this failure: the left dental tissues are insufficient to form holder for the dentine. If the left dental tissues are insufficient, the adhesive and fixing strength for the fiber post will significantly decrease. Meanwhile, canal of bellmouth shape is unfavorable for mechanical fixation of fiber post. This suggests that when choosing indications for fiber post, it should be cautious for patients with insufficient left dental tissues on dental crown or too large canal mouth, or short effective canal length. Hu et al [6] have confirmed in their in vitro experiment that, 1-2 mm dentine support is necessary for restoration of anterior with fiber post.

Precautions for fiber post: 1<sup>st</sup>, the first post should be cut off by using slice cut carborundum disc, thus to avoid damaging the internal structures of fiber post; 2<sup>nd</sup>, light should be directly shined on fiber post crown, parallel to the long axis of fiber post, resin adhesives in the canal will be solidified by utilizing the high light conductivity, thus to increase the consolidating strength.

In general, only if the indications are chosen properly, GLASSIX plus fiber post system can replace conventional metal post core in restoring the affected anterior teeth. Its superior mechanical functions and good aesthetic characteristics can improve successful rate for restoring anterior tooth defects, and obtain relatively ideal effects.