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Ayad, MF, Bahannan, SA, Rosenstiel, SF. **Reinforcement of thin-walled root canal structures for placement of esthetic dowels: A clinical report.** *Gen Dent.* 2011 Jan-Feb;59(1):e18-21

Thin-walled root canals always present a challenge to dentists to select a restorative treatment that does not further weaken the thin tooth structure. The prognosis of dowel and core restorations can be unpredictable. This clinical report describes the treatment of a patient with extensive caries extending into the root canal of an endodontically treated maxillary central incisor. The use of a flowable composite resin in combination with a quartz fiber reinforced post is described, resulting in the rehabilitation of a structurally compromised root canal with satisfactory esthetic and functional outcomes.

*Bitter, K., Noetzel, J., Stamm, O., Vaudt, J., Meyer-Lueckel, H., Neumann, K., Kielbassa, A. **Randomized clinical trial comparing the effects of post placement on failure rate of postendodontic restorations: Preliminary results of a mean period of 32 months.** *J Endod;* 2009 35: 1477 -82

Introduction: The aim of this randomized clinical trial was to assess whether the placement of a fiber post (DT Light Post) (DT) and the amount of residual coronal dentin affect the time to failure of single-unit postendodontic restorations. **Methods:** Ninety patients providing 120 teeth were selected. Three groups (n = 40) were defined on the basis of the amount of residual coronal dentin: 2-walls group, 2 or more coronal walls; 1-wall group, 1 coronal wall; no-wall group, no wall exceeding 2 mm above the gingival level. Within each group teeth were randomized and allocated to 2 intervention groups (n = 20), including subgroups no post (no root canal retention) and subgroups post (placement of DT). **Results:** After a mean observation period of 32.4 (13.7) months in subgroups no post, the failure rates were 10%, whereas in subgroups post, failure rates of 7% were observed (P = .318). In no-wall group post placement significantly affected the time to failure of total restorations (P = .029, log-rank test). Teeth without post retention revealed a significantly higher failure rate (31%) compared with teeth restored with post retention (7%). **Conclusions:** Within the observation time of the present study, fiber post placement was efficacious to reduce failures of postendodontic restorations only with teeth that exhibited no coronal walls. Post insertion for teeth showing a minor substance loss should be critically reconsidered.

Cagidiaco, MC, Goracci, C, Garcia-Godoy, F, Ferrari, M. **Clinical studies of fiber posts: a literature review.** *Int J Prosthodont.* 2008 Jul-Aug;21(4):328-36

Purpose: This literature review aimed to find answers to relevant questions regarding the clinical outcome of endodontically treated teeth restored with fiber posts. **Methods:** All clinical studies published since 1990 in journals indexed in MEDLINE were retrieved by searching PubMed with the query terms "fiber posts and clinical studies." The reference list of the collected articles was also screened for further relevant citations. The strength of the evidence provided by the reviewed papers was assessed according to the criteria of evidence-based dentistry. **Results:** Five randomized controlled trials (RCTs) on fiber posts have been published in peer-reviewed journals. A meta-analysis is not applicable to these studies since they do not address the same specific clinical question. Retrospective and prospective trials without controls are also available. **Conclusions:** Two RCTs indicate that fiber-reinforced composite posts outperform metal posts in the restoration of endodontically treated teeth. However, this evidence cannot be considered as conclusive. Longer-term RCTs would be desirable. The placement of a fiber-reinforced composite post protects against failure, especially under conditions of extensive coronal destruction. The most common type of failure with fiber-reinforced composite posts is debonding.

*Cagidiaco, MC, Radovic, I, Simonetti M, Tay, F, Ferrari, M. **Clinical performance of fiber post restorations in endodontically treated teeth: 2-year results.** *Int J Prosthodont.* 2007 May-Jun;20(3):293-8

Purpose: This study evaluated the 2-year outcome of post-and-core restorative procedures in endodontically treated teeth. The effect of baseline factors (tooth type, number of residual coronal walls, and type of definitive restoration) on restoration failure was assessed. **Methods:** The consecutive sample design included 150 patients. A total of 162 teeth (57 anterior and 105 posterior) were restored. Sixty-nine teeth had 3 or 4 residual coronal walls, while 93 teeth had 2 or fewer walls. Crowns and direct resin composite restorations were placed in 121 and 41 teeth, respectively. After 23 to 25 months, all patients were evaluated. Logistic regression was used to identify the joint effect of variables recorded at baseline (P < .05). **Results:** The only failure modes observed were post debonding (4.3%, 2 in

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anterior teeth and 5 in posterior teeth) and endodontic failure (3.0%, 2 in anterior teeth and 3 in posterior teeth). All post debondings occurred in teeth with 2 or fewer coronal walls that were crown covered. All endodontic failures occurred in crown-covered teeth (1 failure in a tooth with 3 walls and the remaining 4 failures in teeth with 2 or fewer walls). Logistic regression found no statistical significance for any of the variables recorded at baseline.

Conclusions: Restorations placed with the use of a fiber post (D. T. Light-Post, RTD, St Egreve, France) and core resulted in 4.3% post debondings and 3.0% endodontic failures after 2 years of clinical service.

*Cagidiaco, MC., Garcia-Godoy, F., Vichi, A., Grandini, S., Goracci, C., Ferrari, M., **Placement of fiber prefabricated or custom made posts affects the 3-year survival of endodontically treated premolars.** *Am J Dent*; 2008 21: 179-184

Purpose: To assess whether the amount of residual coronal dentin and the placement of a prefabricated (D.T. Light-Post, RTD, St Egreve, France) (LP) or a customized fiber post (Everstick Post) (ES) have a significant influence on the 3-year survival of endodontically treated premolars. **Methods:** A sample of 345 patients provided 6 groups of 60 premolars in need of endodontic treatment. Groups were defined based on the amount of dentin left at the coronal level after endodontic treatment and before abutment build-up. Within each group, teeth were randomly divided into three Sub-groups (n=20). In Sub-group A, no root canal retention was provided for the coronal restoration. In Sub-groups B and C, LP and ES, respectively, were placed inside the root canal. All the teeth were finally restored with a single unit metal-ceramic crown. **Results:** Data were not affected by any loss of follow-up. The overall 36-month survival rate of crowned, endodontically treated premolars was 76.7%. The lowest survival rate was recorded for teeth restored without any root canal retention (62.5%). Teeth restored with LP had a survival rate higher (90.9%) than those restored with ES (76.7%). The Cox regression analysis showed that the presence of root canal retention was a significant factor for survival ($P < 0.05$). The decrease in failure risk was higher in teeth restored with LP ($HR = 0.1$; 95% CI for $HR = 0.09$ to 0.34 ; $P < 0.001$) than when using ES ($HR = 0.5$; 95% CI for $HR = 0.3$ to 0.7 ; $P = 0.003$). Teeth retaining one ($HR = 0.3$; 95% CI for $HR = 0.2$ to 0.7 ; $P = 0.003$), two ($HR = 0.2$; 95% CI for $HR = 0.1$ to 0.5 ; $P < 0.001$), or three coronal walls ($HR = 0.1$; 95% CI for $HR = 0.05$ to 0.3 ; $P < 0.001$), had a significantly lower failure risk than teeth deprived even of the ferrule effect. Similar failure risks existed for teeth missing all the coronal walls, regardless of the presence or absence of a ferrule effect ($P > 0.05$). Interaction terms were not significant ($P > 0.05$). Post placement and the amount of residual coronal dentin affected the 3-year survival of endodontically treated premolars. **Clinical significance:** To obtain the highest success rate, endodontically treated premolars should be restored with a fiber post and a complete crown. The "ferrule" structure has a direct influence on the clinical success rate.

Caine, Jr., R. **Systematic review of survival analysis of fiber reinforced posts.** *J Dent Res. Vol 89 (Spec. Iss. A) Abstract #1002, 2010* (www.dentalresearch.org)

Objectives: To compare the clinical failure rate of different types of prefabricated reinforced fiber posts used for the restoration of endodontically-treated teeth. **Methods:** The inclusion criteria was a single endodontically-treated tooth with a fiber post system on a human study in English. The outcome failures on post systems for endodontically-treated teeth were a loss of post retention, post fracture, and root fracture. Ten studies met the inclusion criteria for a single tooth restoration of endodontically-treated tooth. The quality assessment was based on a random assignment, sample size calculation, inclusion/exclusion criteria, follow-up achieved, a blind design, patient follow-ups (intent to treat), and comparability of control and treatment groups. **Search strategy and data extraction:** Search terms were endodontic-treated tooth, fiber reinforced-post systems, success/failure, kaplan-Meier test, restoration, success/failure, and human studies. Selection of randomized or quasi-randomized clinical trials, endodontically-treated permanent teeth, prefabricated reinforced carbon fiber post. Electronic searches were performed in Cochrane, MEDLINE(OVID) and PubMed databases. Each study that met the inclusion criteria was assessed for the quality of the study. **Results:** The failure rate for prefabricated reinforced fiber posts was 7.8%.

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Fazekas, A, Menyhart, K, Bodi, K, Jako, E **Restoration of root canal treated teeth using carbon fiber posts.** *Fogorv Sz* 1998 Jun;91 (6):163-70

Abstract/conclusions: The restoration of root canal treated teeth – because of the significant loss of tooth structure – is often achieved with post and core. However, posts may generate stresses, which lead to vertical root fracture and the loss of the tooth. Since post design, materials used and post space preparation has significant influence on vertical fracture prevalence, broad investigation is in progress to find the optimal procedure. During the last decade, new prefabricated passive posts were introduced for postendodontic restorations. In order to collect information, clinical trials have been performed on the reconstruction of root canal treated teeth using Carbon fibre posts (C-POST/ COMPOSIPOST; RTD, St Egreve, France). Adhesive technique was applied to cement post in the root canal and for composite core reconstruction. The physical properties of the Carbon fibre posts and the composite are very close to those of the dentine. Post application is simple, does not require special skill and, for the patient, means minimum hazard. The position of the post was controlled by radiography. During the 24 months observation period, no failure was registered in patients treated (N=55). Hence, we attribute our good results to the homogenous reconstruction of the teeth. This procedure seems to be a good alternative to traditional cast metal dowel/cores or metal prefabricated posts.

Ferrari, M., Cagidiaco, C., Goracci, C., Vichi, A., Mason, P. N., Radovic, I., Tay, F. **Long-term retrospective study of the clinical performance of fiber posts** *Am J Dent* 2007;20:287-291.

Purpose: To retrospectively evaluate the long-term clinical performance of three types of fiber posts after a service period of 7-11 years. **Methods:** 985 posts were included in the study: 615 Composiposts, 160 Aesthetic Posts and 210 Aesthetic Plus Posts were placed into endodontically treated teeth. Four combinations of dentin adhesives/luting materials were used. Endodontic and prosthodontic results were recorded. **Results:** A 7-11% failure rate was recorded for the three types of posts. 79 failures in total were noted; 39 due to endodontic reasons, 1 root fracture, 1 fiber post fracture, 17 crown dislodgements and 21 due to post debonding. The mechanical failures were always related to the lack of coronal tooth structure. The results indicated that fiber posts in combination with bonding/luting materials may be used routinely for restoring endodontically treated teeth. Mechanical failure of restored teeth with fiber posts can be related to the amount of residual coronal structure.

*Ferrari, M., Cagidiaco, M., Grandini, S., DeSantis, M., Goracci, C. **Post placement affects survival of endodontically treated premolars.** *J Dent Res* 86(8):729-734, 2007

Abstract: Clinical evidence is lacking regarding the influence of the amount of residual coronal dentin and of post placement on the failure risk of endodontically compromised teeth. The aim of this prospective clinical trial was to assess whether these factors significantly affect the two-year survival of restored pulpless premolars. A sample of 210 individuals provided six experimental groups of 40 premolars in need of endodontic treatment. Groups were defined on the amount of dentin left at the coronal level. Within each group, in half of the teeth selected at random, a fiber post (D. T. Light-Post, RTD, St. Egreve, France) was inserted inside the root canal, whereas in the remaining half of the premolars, no post was placed. All teeth were covered with a crown. The Cox regression analysis revealed that post placement resulted in a significant reduction of failure risk ($p < 0.001$). Failure risk was increased for teeth under the “no ferrule” ($p < 0.001$) and “ferrule effect” conditions ($p < 0.004$).

Ferrari, M., Vichi, A., and Garcia-Godoy, F. **Clinical evaluation of fiber-reinforced epoxy resin posts and cast post and cores.** *American Journal of Dentistry*. 13: 15B-18B, 2000.

Purpose: This retrospective study evaluated treatment outcome of cast post and core and Composipost systems after 4 yrs of clinical service. **Methods:** 200 patients were included in this study. They were divided into two groups of 100 endodontically treated teeth restored with a post. Group 1: Composipost systems were luted into root canal following the manufacturer's instructions. Group 2: Cast post and cores were cemented into root canal preparations with a traditional technique. The patients were recalled after 6 months, 1, 2 and 4 yrs and clinical and radiographic examinations were completed. Endodontic and prosthodontic results were recorded. **Results:** Group 1: 95% of the teeth restored with Composiposts showed clinical success; 3 of these samples were excluded for noncompliance and 2% showed endodontic failure. Group 2: Clinical success was found with 84% of teeth restored with cast post and core. 2% of these samples were excluded for noncompliance, 9% showed root fracture, 2% dislodgment of crown

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and 3% endodontic failure. Statistical evaluation showed significant differences between Groups 1 and 2 ($P < 0.001$). The results of this retrospective study indicated that the Composipost system was superior to the conventional cast post and core systems after 4 years of clinical service.

Ferrari, M., Vichi, A., Mannocci, F., and Mason, P. N. **Retrospective study of the clinical performance of fiber posts.** *American Journal of Dentistry*. 13: 9B-13B, 2000.

Purpose: To evaluate the clinical performance of C-Posts, Aestheti- Posts and Aestheti-Plus Posts (RTD, St Egrevé, France) after a period of clinical service ranging from 1-6 yrs. **Methods:** 1,304 posts were included in the study: 840 Composiposts, 215 Aestheti-Posts and 249 Aestheti-Plus posts were placed into endodontically treated teeth. Four combinations of bonding/luting materials were used. The patients were recalled every 6 months and clinical and radiographic examinations were completed. Endodontic and prosthodontic results were recorded. Actuarial Life Table statistical analysis and Mantel-Haenszel comparison of survival curve have been performed at 95% level of confidence. **Results:** The 3.2% failure rate was due to two reasons: 25 posts debonded during removal of temporary restorations, and 16 teeth showed periapical lesions at the radiographic examination. No statistically significant differences were found among the four groups. The results of this retrospective study indicate that fiber posts in combination with bonding / luting materials can be routinely used.

*Ferrari, M, Cagidiaco, M., Vichi, A., Grandini, S., Goracci, C. **Post placement and residual coronal structure affect root-treated premolars' survival.** *J Dent Res. Vol 86 (Spec. Iss. A) Abstract #1385, 2007* (www.dentalresearch.org)

Objective: to assess whether the amount of residual coronal dentin and the placement of a fiber post (D. T. Light-Post; RTD, St Egrève, France) or EverStick Post (Stick Tech, Turku, Finland) have a significant influence on the three-year survival of restored pulpless premolars. **Methods:** A sample of 345 patients provided 6 cohorts of 60 premolars in need of endodontic treatment. Cohorts were defined based on the amount of dentin left at the coronal level after endodontic treatment and before abutment build-up. Within each cohort teeth were randomly divided into three Subgroups ($n=20$). In Subgroup A no endocanal retention was provided for the coronal restoration. In Subgroups B and C a fiber post (RTD) and Stick Tech fibers (ST) respectively were placed inside the root canal. All the teeth were covered with porcelain fused to metal crowns. **Results:** Data were not affected by any loss to follow-up. The overall 36-month survival rate of crowned endodontically treated premolars was 76.70%. The lowest survival rate was recorded for teeth restored without any endocanal retention (62.5%). Teeth restored with RTD had a survival rate higher (90.9%) than those restored with ST (76.7%). The Cox regression analysis showed that the presence of an endocanal retention was a significant factor for survival ($p < 0.05$). The decrease in failure risk was higher in teeth restored with RTD than when using ST. Teeth retaining one, two, or three coronal walls had a significantly lower failure risk than teeth deprived even of the ferrule effect. Similar failure risks existed for teeth missing all the coronal walls regardless of the presence or absence of a ferrule effect. Interaction terms were not significant ($p > 0.05$). **Conclusion:** Post placement and the amount of residual coronal dentin affect the 3-year survival of endodontically treated premolars.

Ferrari, M., Cagidiaco, M., Magni, E., Cadenaro, M., Breschi, L. Goracci, C. **Clinical performance of fiber post restorations: 2-year results.** *J Dent Res. Vol 88 (Spec. Iss. A) Abstract # 1015, 2009.* (www.dentalresearch.org)

Objectives: To evaluate the 2-year outcome of post-retained restorations of endodontically treated teeth. **Methods:** A consecutive sample of 45 patients was collected and 45 premolars (25 maxillary, 20 mandibular) were restored. RelyX Fiber posts (3M ESPE) were luted with RelyX Unicem (3M ESPE) following manufacturer's instructions. Filtek Flow (3M ESPE) was used to build-up the abutment, that was covered with an all-ceramic crown (Empress II, Ivoclar-Vivadent). Baseline factors such as tooth type and number of residual coronal walls were noted. After 23-25 months patients were recalled and two operators who had been previously calibrated separately performed a clinical and radiographic examination. The following events were considered as failures: post debonding, post fracture, root fracture, failure of the core portion requiring a new coronal restoration, displacement of the crown, endodontic and periradicular conditions requiring endodontic retreatment. Kaplan-Meier plots were constructed. The Cox regression analysis was applied to assess the influence of baseline factors on failure occurrence. **Results:** One patient could not be re-evaluated. Radiographic signs of periapical pathology were observed in 3 teeth, though symptoms were

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reported for only 1 of them. The 3 teeth showing periapical lesions also had the post de-bonded. Overall, 4 teeth with 2 residual coronal walls exhibited post de-bonding along with marginal leakage. All de-bonded posts were re-luted and the teeth were thus restored to function. The survival rate of post-retained restorations in this study was similar to the rates reported in previous clinical trials. The Cox regression analysis did not reveal any significant influence of baseline factors on failure occurrence. **Conclusions:** Restorations of endodontically treated premolars retained by fiber posts luted with a self-adhesive resin cement showed a satisfactory success rate after 2 years of clinical service. All the 4 recorded failures consisted of post de-bonding, while no irreparable failures such as root fracture occurred.

*Ferrari, M., Vichi, A., Fadda, G.M., Cagidiaco, M.C., Tay, F.R., Breschi, L., Polimeni, A., Goracci, C. **A randomized controlled trial of endodontically treated and restored premolars.** doi: 10.1177/0022034512447949 *JDR July 2012 vol. 91 no. 7 suppl S72-S78*

This in vivo study examined the contribution of remaining coronal dentin and placement of a prefabricated (LP) or customized fiber post (ES) to the six-year survival of endodontically treated premolars. A sample of 345 patients provided 6 groups of 60 premolars each in need of endodontic treatment. Groups were classified according to the number of remaining coronal walls before abutment build-up. Within each group, teeth were allocated to one of three subgroups: (A) no post retention; (B) LP; or (C) ES (N = 20). All teeth were protected with a crown. Cox regression analysis revealed that fiber post retention significantly improved tooth survival ($p < 0.001$). Failure risk was lower in teeth restored with prefabricated ($p = 0.001$) than with customized posts ($p = 0.009$). Teeth with one ($p = 0.004$), two ($p < 0.001$), and three coronal walls ($p < 0.001$) had significantly lower failure risks than those without ferrule. Similar failure risks existed for teeth without coronal walls, regardless of the presence/absence of ferrule ($p = 0.151$). Regardless of the restorative procedure, the preservation of at least one coronal wall significantly reduced failure risk. **PDF**

Gbadebo, OS, Ajayi, DM, Dosumu Oyekunle, OO, Shaba, PO. **Randomized clinical study comparing metallic and glass fiber post in restoration of endodontically treated teeth.** *Indian J Dent Res.* 2014 Jan-Feb;25(1):58-63. doi: 10.4103/0970-9290.131126.

Background: Post-retained crowns are indicated for endodontically treated teeth (ETT) with severely damaged coronal tissue. Metallic custom and prefabricated posts have been used over the years, however, due to unacceptable color, extreme rigidity and corrosion, fiber posts, which are flexible, aesthetically pleasing and have modulus of elasticity comparable with dentin were introduced. Aim: To compare clinical performance of metallic and glass fiber posts in restoration of ETT. **Methods:** 40 ETT requiring post retained restorations were included. These teeth were randomly allocated into 2 groups. Twenty teeth were restored using a glass fiber-reinforced post (FRP) and 20 others received stainless steel Parapost (PP), each in combination with composite core buildups. Patients were observed at 1 and 6 months after post placement and cementation of porcelain fused to metal (PFM) crown. Marginal gap consideration, post retention, post fracture, root fracture, crown fracture, crown de-cementation and loss of restoration were part of the data recorded. All teeth were assessed clinically and radiographically. Fisher's exact test was used for categorical values while log-rank test was used for descriptive statistical analysis. **Results:** One tooth in the PP group failed, secondary to de-cementation of the PFM crown giving a 2.5% overall failure while none in the FRP group failed. The survival rate of FRP was thus 100% while it was 97.5% in the PP group. This however was not statistically significant (log-rank test, $P = 0.32$). **Conclusion:** Glass FRPs performed better than the metallic post based on short-term clinical performance.

Glazer, B. **Restoration of endodontically treated teeth with carbon fibre posts - A prospective study.** *Journal of the Canadian Dental Association.* 66: 613-618, 2000.

Abstract: A prospective study was started in 1995 to evaluate the success of carbon fibre reinforced epoxy resin (Composipost) posts used to restore endodontically treated teeth. All the teeth in the study had lost more than 50% of their coronal structure. **Methods:** Fifty-nine carbon fibre Composiposts (RTD, St Egrevé, France) cemented with C & B Metabond and built up with Core Paste cores were placed into the teeth of 47 patients. Each tooth received a

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full-coverage restoration (porcelain fused to metal crown) and was followed for 6.7-45.4 months (average = 28.0 months, standard deviation = 10.7). **Results:** Results for 52 teeth in 42 patients were analyzed. There were no fractures. The overall failure rate was 7.7% and the cumulative survival rate was 89.6% at the end of the follow-up period. The only statistically significant finding ($p=0.04$) was that posts in lower premolars were at higher risk of failure. **Conclusion:** Composipost posts are among the most predictable systems available today. Composipost posts in the upper anterior teeth are associated with a higher success rate and longer life than those placed in premolars, especially lower premolars. This study contributes to the growing body of evidence that supports the use of Composipost posts in the restoration of endodontically treated teeth.

*Goracci, C., Cagidiaco, M., Cagidiaco, E., Vichi, A., Grandini, S., Ferrari, M.. **Effects of oral environment and occlusal wear on FRC-posts integrity.** *J Dent Res. Vol 86 (Spec. Iss. A) Abstract #0131, 2007* (www.dentalresearch.org)

Objectives: To evaluate whether the exposure to the oral environment and occlusal wear during function affects the morphological integrity of fiber posts underlying a luted crown or a direct composite restoration. **Methods:** Two groups of endodontically treated teeth restored with D. T. Light- Posts (RTD, St. Egrevé, France) were investigated. Group 1 included ten crowned teeth in which the abutment had the post head exposed on the surface. Group 2 included ten teeth directly restored with resin composite and presenting with the post head exposed on the occlusal surface of the restoration. For baseline evaluation, polyether impressions (Permadyne, 3M ESPE) were taken of the abutments before crown luting in Group 1, and of the restorations occlusal surfaces immediately after polishing in Group 2. **Results:** After a 5-year period of clinical service, polyether impressions were taken again for each experimental tooth. All the impressions were developed with epoxy resin and observed under a scanning electron microscope (Jeol, Tokyo, Japan), in order to assess whether the post surface underwent structural changes due to water uptake (Groups 1 and 2) and/or occlusal wear (Group 2) during the clinical function. **Results:** In neither group microscopic signs of post surface degradation due to water uptake were seen. In Group 2 wear signs were visible on the exposed post surface, as well as on the surface of the direct composite. **Conclusion:** Over a 5-year period, in case the fiber post surface is exposed on the top of the abutment, the seal provided by the crown effectively protects the fiber post against water uptake. When the post surface is exposed in a direct resin restoration, it does not show evident morphological changes related to water degradation, although it exhibits a loss of structure due to occlusal wear.

*Grandini, S., Goracci, C., Tay, F., Grandini, R., Ferrari, M **Clinical evaluation of the use of fiber posts and direct resin restorations for endodontically treated teeth** *Int J Prosthodont 2005;18:399-404.*

Purpose: Restoration of root-treated teeth is routinely performed in clinical practice with a choice of therapeutic options, considering many factors to provide optimal mechanical properties, esthetics, and longevity. The aim of the present work was to present a preliminary clinical report on the use of fiber posts and direct resin composites for restoring root-treated teeth. **Methods:** Thirty-eight anterior and 62 posterior endodontically treated teeth were selected from 3 private prosthodontic offices. The protocol used included endodontic treatment, with translucent fiber posts (D. T. Light-Post, RTD St Egrevé, France) bonded to the post-space using a '1-bottle' adhesive (One-Step, Bisco) and a dual-cure resin cement (Duo-Link, Bisco). Direct resin restorations were performed using a micro-hybrid resin composite (Gradia Direct, GC) and a layering technique. Both opaque dentin and enamel and translucent enamel shades were used. **Results:** Patients were recalled after 6, 12, 24, and 30 months, and the restorations assessed according to predetermined clinical and radiographic criteria. These clinician-mediated evaluation methods confirmed the good clinical performance of the restorations. **Conclusions:** Restoration of endodontically treated teeth with fiber posts and direct resin composites is a treatment option, that in the short term conserves remaining tooth structure and results in good patient compliance.

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Juloski, J, Fadda, GM, Monticelli, F, Fajó-Pascual, M, Goracci, C, Ferrari, M. **Four-year Survival of Endodontically Treated Premolars Restored with Fiber Posts.** *J Dent Res.* 2014 Mar 19;93(7 suppl):52S-58S. [Epub ahead of print]

The objective of this prospective clinical trial was to investigate the influence of the residual coronal structure of endodontically treated teeth and the type of cement used for luting fiber posts on four-year clinical survival. Two groups (n = 60) were defined, depending on the amount of residual coronal dentin after abutment build-up and final preparation: (1) more than 50% of coronal residual structure; and (2) equal to or less than 50% of coronal residual structure. Within each group, teeth were randomly divided into 2 subgroups (n = 30) according to the material used for luting fiber posts: (A) resin core build-up material, Gradia Core; or (B) self-adhesive universal cement GCem Automix. The rate of success was assessed based on clinical and intra-oral radiographic examinations at the follow-up after 6, 12, 24, 36, and 48 months. The highest 48-month success and survival rates were recorded in group 1A (90% and 100%, respectively), whereas teeth in group 2B exhibited the lowest performance (63.3% success rate, 86.6% survival rate). Cox regression analysis revealed that neither the amount of coronal residual structure nor the luting material significantly influenced the failure risk ($p > .05$).

Malferrari S, Monaco C, Scotti R. **Clinical evaluation of teeth restored with quartz fiber-reinforced epoxy resin posts.** *Int J Prosthodont.* 2003 Jan-Feb;16(1):39-44.

Purpose: This prospective clinical follow-up evaluated the acceptability of quartz fiber-reinforced epoxy posts used in endodontically treated teeth over a 30-month period. **Methods:** In 132 patients, 180 endodontically treated teeth were restored using AEstheti-Plus quartz-fiber posts. The posts were luted with the All-Bond 2 adhesive system and C&B Resin Cement according to the manufacturer's recommendations. The core was made with Core-Flo or Bis-Core, and all-ceramic crowns or metal-ceramic crowns were applied as final restorations. The parameters considered as clinical failure were displacement, detachment, or fracture of posts; core or root fracture; and crown or prosthesis decementation. Patients were reevaluated at 6, 12, 24, and 30 months. **Results:** One cohesive failure involving a margin of the composite core was observed after 2 weeks, and two adhesive fractures were seen after 2 months. These failures were located between the cement and the dentin walls of the canals. All three failures occurred during removal of the temporary crown. The percentage of failures was thus 1.7% over a 30-month period, but it was possible to successfully replace the restoration in all three failed cases. **Conclusions:** Over a 30-month period, the rehabilitation of endodontically treated teeth using quartz-fiber posts showed good clinical results. No crown or prosthesis decementation was observed, and no post, core, or root fractures were recorded.

Malferrari, S, Baldissara, P, Arcidiacono, A, **Translucent Quartz Fiber Posts: a 20 Month In vivo Study.** *J Dent Res.* 81 IADR Abstract #2656; 2002 (www.dentalresearch.org)

Abstract: In the attempt to achieve the best-performing post and core restoration, many post systems have been studied. In the recent past, the aesthetic fiber posts, in combination with resin luting cement, have been proposed to provide a reliable rehabilitation for the endodontically treated tooth. The new translucent fiber posts show interesting mechanical properties (comparable to the dentin) and aesthetic characteristics that enhance a final rehabilitation with an all-ceramic crown...with satisfying results. **Objectives:** The purpose of this study was to evaluate the clinical behavior of 84 endodontically treated teeth treated with translucent quartz fiber posts. Thirty four teeth received a Light-Post (RTD/Bisco Dental) and 50 teeth received the Endo Light-Post (RTD, St. Egrevé, France). To perform the cementation, Bisco One-Step and dual – cure Duo-Link (Bisco) were utilized. The luting cement was polymerized through the translucency of the post. **Methods:** All of the core restorations were performed using Core-Flo (Bisco) or Bis-Core (Bisco) composite resin and finalized with an all-ceramic crown. In accordance with the international literature, data, useful for the longitudinal evaluations, were recorded on diagrams. The survival rate of the post and core was evaluated after 2 weeks, 1, 3, 6, 12 and 20 months. Post displacement or detachment, post fracture, restoration fracture and root fracture were investigated. **Results:** No failures took place up to the present day. **Conclusions:** According to these results, and within the limitations of this study, it is possible to assume that the clinical performance of these translucent fiber posts is successful. Further data will be needed for long-term clinical evaluations of the outcome.

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Mannocci, F, Bertelli, E, Sherriff, M, Watson, TF, Ford, TR. **Three-year clinical comparison of survival of endodontically treated teeth restored with either full cast coverage or with direct composite restoration.** *J Prosthet Dent.* 2002 Sep;88(3):297-301. *Evid Based Dent.* 2004;5(2):45.

Statement of problem: Little information exists regarding the outcome of crown build-ups on endodontically treated teeth restored with metal-ceramic crowns or with only a direct-placed composite. **Purpose:** The aim of this study was to evaluate the clinical success rate of endodontically treated premolars restored with fiber posts and direct composite restorations and compare that treatment with a similar treatment of full-coverage with metal-ceramic crowns. **Methods:** Subjects included in this study had one maxillary or mandibular premolar for which endodontic treatment and crown build up was indicated and met specific inclusion/exclusion criteria. Only premolars with Class II carious lesions and preserved cusp structure were included. Subjects were randomly assigned to 1 of the following 2 experimental groups: (1) teeth endodontically treated and restored with adhesive techniques and composite or (2) teeth endodontically treated, restored with adhesive techniques and composite, and then restored with full-coverage metal-ceramic crowns. Sixty teeth were included in the first group and 57 in the second. All restorations were performed by one operator. Causes of failure were categorized as root fracture, post fracture, post decementation, clinical and/or radiographic evidence of marginal gap between tooth and restoration, and clinical and/or radiographic evidence of secondary caries contiguous with restoration margins. Subjects were examined for the listed clinical and radiographic causes of failure by 2 calibrated examiners at intervals of 1, 2, and 3 years. Exact 95% confidence intervals for the difference between the 2 experimental groups were calculated. **Results:** At the 1-year recall, no failures were reported. The only failure modes observed at 2 and 3 years were decementations of posts and clinical and/or radiographic evidence of marginal gap between tooth and restoration. There was no difference in the failure frequencies of the 2 groups (95% confidence interval, -17.5 to 12.6). There was no difference between the number of failures caused by post decementations and the presence of marginal gaps observed in the 2 groups (95% confidence intervals, -9.7 to 16.2 and -17.8 to 9.27). **Conclusion:** Within the limitations of this study, the results upheld the research hypothesis that the clinical success rates of endodontically treated premolars restored with fiber posts and direct composite restorations after 3 years of service were equivalent to a similar treatment of full coverage with metal-ceramic crowns

Mannocci, F, Qualtrough, AJ, Worthington, HV, Watson, TF, Pitt Ford, TR. **Randomized clinical comparison of endodontically treated teeth restored with amalgam or with fiber posts and resin composite: five-year results.** *Oper Dent.* 2005 Jan-Feb;30(1):9-15, *Comment: J Evid Based Dent Pract.* 2006 Jun;6(2):176-7.

Prospective clinical studies comparing the results of different types of restorations of endodontically treated teeth are lacking. This study compared the clinical success rate of endodontically treated premolars restored with fiber posts and direct composite to the restorations of premolars using amalgam. Premolars with Class II carious lesions were selected and randomly assigned to one of two experimental groups: (1) restoration with amalgam or (2) restoration with fiber posts and composite. One hundred and nine teeth were included in Group 1 and 110 in Group 2. Patients were recalled after 1, 3 and 5 years. No statistically significant difference was found between the proportion of failed teeth in the two experimental groups. Significant differences were observed between the proportion of root fractures ($p=0.029$) and caries ($p=0.047$), with more root fractures and less caries observed in the teeth restored with amalgam at the five-year recall. **Conclusions:** Within the limits of this study, it can be concluded that restorations with fiber posts and composite were found to be more effective than amalgam in preventing root fractures but less effective in preventing secondary caries.

Mehta, SB, Millar, BJ. **A comparison of the survival of fibre posts cemented with two different composite resin systems.** *Br Dent J.* 2008 Dec 13;205(11):E23. *Epub* 2008 Nov 21.

Objectives: To evaluate the outcomes of a fibre post cemented with two different luting agents. **Methods:** A single type of tooth coloured fibre post (Fibre-White Parapost, Coltene Whaledent) was used along with two different types of luting cement. A total of 129 teeth were treated in this retrospective audit: 79 treated were luted with Calibra Aesthetic Dental Resin Cement (Dentsply) and 50 with Panavia F 2.0 (Kuraray). All teeth were treated by the same operator and had a minimum ferrule of 2 mm and a ParaCore (Coltene Whaledent) composite core placed over the post. Where Calibra Aesthetic Dental Resin Cement was used, all the restorations were undertaken between June 2002 and October 2003 and were reviewed for a period of 38 to 54 months. Where Panavia had been used, all restorations were placed between February 2004 and December 2005 and reviewed for a period of 28 to 50 months.

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Results: The results for the Calibra cemented posts were: 64 returned for recall and of these 23 were classed as failed. The causes were: root fracture (2), decementation (3), fracture at post-core interface (6), endodontic failure (8) and marginal caries (4). The results for the Panavia cemented posts were: 44 returned for recall and 9 were classed as failed; the causes of failure were fracture at post-core interface (6), endodontic failure (1) and marginal caries (2). **Conclusions:** For posts cemented with Calibra, a success rate of 64.1% was determined over a period of 38 to 54 months. The use of Panavia resulted in fewer post failures with a reported success rate of 79.5% over an evaluation period of 28 to 50 months. Mechanical failures by means of fractures occurring anywhere along the length of the post-core complex were the major cause of lack of success. Significantly higher failure rates were observed to occur in partially dentate patients, in those with parafunctional habits and also amongst anterior teeth. While the majority of the mechanical failures were amenable to repair, the latter mode of failure appears to be a major downfall when considering the routine use of fibre resin posts in restorative dentistry. The choice of cement appears to have a significant role in improving prognostic outcome.

*Monticelli, F., Grandini, S., Goracci, C., Ferrari, M. **Clinical behavior of translucent fiber posts: a 2-year prospective study.** *Int. J Prosthodont* 2003; 16:593-596

Purpose: This study prospectively evaluated the clinical performance of three types of translucent posts over a follow-up period of between 2 and 3 years. **Methods:** Selected were 225 patients with one premolar in need of endodontic treatment, followed by restoration with a fiber post and porcelain crown. The sample was randomly divided into three groups of 75 patients each. The same type of post was used in all patients within the group: Group 1=Aestheti-Plus posts (RTD), Group 2= D. T. Light-Post (RTD, St Egreve, France), and Group 3= FRC Postec (Vivadent / Ivoclar). For bonding the posts, a light-cure adhesive (One-Step; Bisco Dental) and a dual-curing resin cement (Duo-Link; Bisco Dental) were applied in Groups 1 and 2, whereas self-curing materials ExciteDSC adhesive (Vivadent/ Ivoclar) and MultiLink resin cement (Vivadent / Ivoclar) were used with Group 3. After 6, 12 and 24 months, patients were recalled, and a clinical and radiographic examination was performed. For some patients, 30-month follow-up data were also collected. **Results:** Debonding of the post occurred in eight cases (3.5%); in another six cases, a recurrence of the periapical lesion was reported. **Conclusion:** The statistical analysis did not reveal any significant difference in the survival rate of the tested posts, suggesting that all are equally and sufficiently reliable for clinical use.

Monticelli, F., Ferrari, M. **Coronal residual structure affects the four-year survival of root-treated premolars.** *J Dent Res. Vol 92 (Spec Iss A) Abstract #3108, 2013 (www.dentalresearch.org)*

Objective: To assess whether the amount of residual coronal structure and the placement of a prefabricated fiber posts luted with a self-adhesive cement or a composite core material may affect the four-year survival of root filled premolars. **Method:** A sample of 120 patients provided 2 cohorts of 60 premolars needing endodontic treatment. Cohorts were defined depending on the amount of residual coronal dentin after abutment build-up and final preparation: Group A: more than 50% of coronal residual structure and at least 2 sound residual walls; Group B: less than 50% of coronal residual structure and less than 2 sound residual walls. However, at least one residual wall and a 1.5 mm ferrule was present. Teeth were randomly divided into two Subgroups (n=30) accordingly to the material used for luting posts. In Subgroup 1 a core material, (Gradia Core, GC Co., Tokyo, Japan, CM) was used, while in Subgroups 2 posts were luted using a self-adhesive cement (GCem, GC Co., SAC). Teeth were finally restored with single unit metal-ceramic crowns. **Result:** Data were not affected by any loss to follow-up. The presence of more than 50% of coronal residual structure was a significant factor for survival ($p<0.05$). The highest 48-months survival rate of crowned endodontically treated premolars was 90.0% for fiber posts luted with CM and with more than 50% of residual coronal structure. The lowest survival rate was recorded for fiber posts luted with SAC on abutments with less than 50% of coronal residual structure (73.3%). Clinical failure was mainly due to loss of retention, post debonding or crown dislodgement. **Conclusion:** The amount of residual coronal structure affects the four-year survival of filled premolars. The highest clinical success rate may be achieved when luting fiber posts with a core material on abutments with more than 50% of residual coronal structure.

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Naumann, M, Blankenstein, F, Dietrich, T. **Survival of glass fibre reinforced composite post restorations after 2 years-an observational clinical study.** *J Dent.* 2005 Apr;33(4):305-12.

Objectives: The aim of this study is to provide prospective clinical data for the survival of postendodontic reconstructions of teeth with varying degrees of hard tissue loss using tapered or parallel-sided post shapes. **Methods:** Eighty-three patients got 105 glass fibre reinforced posts of tapered (Luscent Anchors, Dentatus, Glassix, Sweden) and parallel-sided, serrated (FibreKor, Jeneric Pentron, USA) post shape. A dual curing hybrid composite Compolute (3M ESPE, Germany) was used as luting material, EBS-Multi (3M ESPE) as adhesive system and Clearfil Core (Kuraray, Japan) for core built-up. The restorations were followed for a minimum of 24 months. The statistical analysis was performed on a random sub-sample of one restoration per subject. The Fisher exact test was used to compare frequencies of failures after 12 and 24 month. A Kaplan-Meier-analysis was used to analyse time-to-failure in both groups. Differences of survival time between post types were tested with the log-rank test. **Result:** 3.8% of the restorations failed after 12 month, 12.8% after 24 month, respectively. The main failure type observed was post fractures. All but one failed teeth could be restored. There was no difference in failure frequency between post types after 12 or 24 months. The log-rank test showed no differences in survival between the two types of post ($p=0.37$). **Conclusion:** Parallel-sided and tapered glass fibre posts result after 2 years of clinical service in an equal rate of survival.

Naumann, M., Reich, S., Nothdurft, F., Beuer, F., Schirrmeister, J., Dietrich, T. **Survival of glass fiber posts restorations over 5 years.** *Am J Dent;* 21:267-272.

Purpose: To evaluate the survival of glass fiber reinforced composite post (GFP) restorations and to identify risk factors for restoration failure. **Methods:** GFPs of three consecutively placed post systems, two tapered and one parallel-sided, were adhesively luted and the core was built with a resin composite. Teeth served as abutment teeth according to the prosthetic treatment plan. 149 GFP in 121 patients (age: 53 +/- 15 year; 50 men; 71 women) were followed for 5-79 months (mean +/- SD: 50 +/- 21 months). Cox proportional hazards models were used to evaluate the association between several clinical variables and the failure rate. **Results:** After exclusion of endodontic failures ($n = 3$), significantly higher failure rates were found for restorations of anterior teeth compared to posterior teeth (hazard regression (HR): 2.8; 95% confidence interval (CI): 1.4; 5.8; $P = 0.004$). Restorations in teeth with no proximal contacts compared to at least one proximal contact, single crowns compared to fixed partial dentures and less than two remaining cavity walls had a HR of 2.4 (CI: 0.8-7.1), 2.4 (CI: 0.6-8.7), and 1.5 (CI: 0.6-3.8), respectively. However, these correlations were not statistically significant ($P > 0.05$).

Naumann, M, Koelpin, M, Beuer, F, Meyer-Lueckel, H. **Ten-year survival evaluation for glass-fiber-supported postendodontic restoration: a prospective observational clinical study.** *J Endod.* 2012 Apr;38(4):432-5. *Epub* 2012 Feb 16.

Introduction: Glass-fiber-reinforced endodontic posts (GFRPs), in combination with composite resin core materials, are commonly used to build up damaged endodontically treated teeth. However, long-term clinical data are scarce. Thus, the aim of this investigation was to evaluate the survival of 3 different GFRP systems, taking into account several other relevant factors. **Methods:** One-hundred forty-nine GFRPs in 122 patients were followed for up to 120 months. GFRPs were adhesively luted using the etch-and-rinse technique. The core was built with a chemically curing composite resin and restored according to the specific prosthetic treatment plan. Cox proportional hazards models were used to evaluate the association between clinical variables and the time until failure. **Results:** Within 10 years, 55 failures could be observed (annual failure rate = 4.6%) with the most frequent ones being post fracture, loss of post retention (both $n = 17$), endodontic problems ($n = 7$), and those resulting in tooth extraction ($n = 10$). Sixty posts could be followed up for 105 to 120 months (34 posts lost to follow-up, [mean (standard deviation) survival time: 74 (43) months]). In crude analyses, only the tooth type in favor of posterior teeth compared with anterior teeth and the number of remaining cavity walls (in favor of ≥ 1 compared with no wall) were significantly associated with the failure rate. Cox regression analysis revealed a significant hazard ratio of 2.0 (95% confidence interval, 1.1-3.5; $P = .021$) for tooth type in favor of posterior teeth. **Conclusions:** The relatively high annual failure rate of GFRPs highlights that the treatment decision should take into account the most relevant factors as tooth type and the number of remaining cavity walls.

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Naumann, M, Sterzenbac, G, Alexandra, F, Dietrich, T. **Randomized controlled clinical pilot trial of titanium vs. glass fiber prefabricated posts: preliminary results after up to 3 years.** *Int J Prosthodont.* 2007 Sep-Oct;20(5):499-503.

Purpose: This randomized parallel-group clinical pilot study aimed to compare the clinical outcome of prefabricated rigid titanium to glass fiber endodontic posts when luted with self-adhesive universal resin cement. **Methods:** Ninety-eight patients in need of postendodontic restoration were assessed for eligibility. Ninety-one patients met the selection criteria and were randomized and allocated to 2 intervention groups. Forty-five participants were treated using a titanium post and 46 participants received a glass fiber post, each in combination with composite core buildups for postendodontic restoration. All posts had a diameter of 1.4 mm and a length of 13 mm and were cemented 8 mm within the root canal with self-adhesive universal resin cement. A circumferential ferrule of 2 mm was always provided. Surgical crown lengthening was necessary in 13 cases. Patients were observed in intervals of 3, 6, 12, 24, and 36 months after post placement. **Results:** After 24 to 36 months (mean \pm SD: 27.9 \pm 5.6) of observation following post placement, 1 tooth was extracted because of changes of the prosthetic treatment plan. No failures were observed among the 88 patients with follow-up data. **Conclusions:** Both titanium and glass fiber reinforced composite posts result in successful treatment outcomes after 2 years. The material combination used seems to be appropriate in the short term for cementing endodontic posts, irrespective of the post material.

*Parisi, C, Valandro, LF, Ciocca, L, Gatto, MR, Baldissara, P. **Clinical outcomes and success rates of quartz fiber post restorations: A retrospective study.** *J Prosthet Dent.* 2015 May 23. pii: S0022-3913(15)00148-1. doi: 10.1016/j.prosdent.2015.03.011. [Epub ahead of print]

Statement of Problem: Cast metal posts and dowels are inherently dark and, when metal-free restorations are used, could impair the definitive esthetic appearance. Quartz fiber posts could represent a reliable choice for restoring abutment teeth. **PURPOSE:** The purpose of this study was to evaluate the long-term success rate of teeth restored with quartz fiber posts and fixed dental prostheses (FDPs). **Methods:** Ninety-nine teeth restored with 114 quartz fiber posts and FDPs were evaluated. The evaluation time ranged from 7 months to 9.25 years. The Kaplan-Meier method was used to obtain success curves. The influence of the tooth location, definitive restoration, and failure pattern upon the success function was analyzed with the log-rank test. The Cox regression test was used to evaluate possible predictors among the interactions of the observed parameters. **Results:** The success rate of the restorations was 85.86% in a mean period of 5.88 ± 1.37 years, with an estimated success probability of 85% at 6.17 years. The statistical analysis identified the factors related to the arch ($P=.045$) and type of definitive restoration ($P=.021$) as significantly associated with success. Post debonding was the most frequent failure mode, followed by endodontic failure, with the latter not necessarily being related to the post itself. No root fractures were recorded. Twelve teeth out of the 14 that failed were restored again, bringing the overall survival rate of the teeth to 98%. **Conclusions:** The rehabilitation of abutment teeth with quartz fiber posts can be considered a reliable procedure; however, adhesive techniques and luting materials require improvement.

Preethi, G, Kala, M. **Clinical evaluation of carbon fiber reinforced endodontic post, glass fiber reinforced post with cast post and core: A one year comparative clinical study.** *J Conserv Dent.* 2008 Oct;11(4):162-7

Aim: Restoring endodontically treated teeth is one of the major treatments provided by the dental practitioner. Selection and proper use of restorative materials continues to be a source of frustration for many clinicians. There is controversy surrounding the most suitable choice of restorative material and the placement method that will result in the highest probability of successful treatment. This clinical study compares two different varieties of fiber posts and one cast post and core in terms of mobility of crown margin under finger pressure, recurrent caries detected at the crown margin, fracture of the restoration, fracture of the root and periapical and periodontal pathology requiring crown removal over the period of 12 months as evaluated by clinical and radiographical examination. **Methods:** 30 root canal treated, single rooted maxillary anterior teeth of 25 patients in the age range of 18-60 years where a post retained crown was indicated were selected for the study between January 2007 and August 2007; and prepared in a standard clinical manner. It was divided into 3 groups of 10 teeth in each group. After post space preparation, the Carbon fiber and Glass fiber reinforced posts were cemented with Scotch bond multipurpose plus bonding agent and RelyX adhesive resin cement in the first and second groups respectively. The Cast post and cores were cemented with Zinc Phosphate cement in the third group. Following post- cementation, the preparation was further refined and a rubber base impression was taken for metal-ceramic crowns which was cemented with Zinc Phosphate cement. A

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baseline periapical radiograph was taken once each crown was cemented. All patients were evaluated after one week (baseline), 3 months, 6 months and one year for following characteristics mobility of crown margin under finger pressure, recurrent caries detected at the crown margin, fracture of the restoration, fracture of the root and periapical and periodontal pathology. **Results:** Results after 12 months showed that none of the restorations among groups of cast post and core, carbon fiber reinforced post and glass fiber reinforced post with composite core restorations failed in terms of recurrent caries detected at the crown margin, fracture of the restoration, fracture of the root and periapical and periodontal pathology. One case of cast post and core and one case of carbon fiber reinforced post with composite core restorations showed slight mobility of crown margin under finger pressure at 12(th) month recall but all the cases of glass fiber post with composite core restorations did not show any signs of mobility of crown margin under finger pressure at all the recall periods on clinical and radiographical examination. **Conclusion:** From this 12 months clinical evaluation of all the cases in the 3 groups comprising of cast post and core; carbon fiber reinforced post with composite core and glass fiber reinforced post with composite core restored with porcelain fused to metal crowns, it is concluded that glass fiber reinforced post with composite core when used in single rooted upper anterior teeth are associated with a higher success rate in restoration of endodontically treated teeth.

Salvi GE, Siegrist Guldener BE, Amstad T, Joss A, Lang NP. **Clinical evaluation of root filled teeth restored with or without post-and-core systems in a specialist practice setting.** *Int Endod J.* 2007 Mar;40(3):209-15.

Aim: To assess survival rates and complications of root-filled teeth restored with or without post-and-core systems over a mean observation period of ≥ 4 years. **Methodology:** A total of 325 single- and multi-rooted teeth in 183 subjects treated in a private practice were root filled and restored with either a cast post-and-core or with a prefabricated titanium post and composite core. Root-filled teeth without post-retained restorations served as controls. The restored teeth served as abutments for single unit metal-ceramic or composite crowns or fixed bridges. Teeth supporting cantilever bridges, over-dentures or telescopic crowns were excluded. **Results:** Seventeen teeth in 17 subjects were lost to follow-up (17/325: 5.2%). The mean observation period was 5.2 ± 1.8 (SD) years for restorations with titanium posts, 6.2 ± 2.0 (SD) years for cast post-and-cores and 4.4 ± 1.7 (SD) years for teeth without posts. Overall, 54% of build-ups included the incorporation of a titanium post and 26.5% the cementation of a cast post-and-core. The remaining 19.5% of the teeth were restored without intra-radicular retention. The adjusted 5-year tooth survival rate amounted to 92.5% for teeth restored with titanium posts, to 97.1% for teeth restored with cast post-and-cores and to 94.3% for teeth without post restorations, respectively. The most frequent complications included root fracture (6.2%), recurrent caries (1.9%), post-treatment peri-radicular disease (1.6%) and loss of retention (1.3%). **Conclusions:** Provided that high-quality root canal treatment and restorative protocols are implemented, high survival and low complication rates of single- and multi-rooted root-filled teeth used as abutments for fixed restorations can be expected after a mean observation period of ≥ 4 years.

Sarkis-Onofre, R, Jacinto, RD, Boscato, N, Cenci, MS, Pereira-Cenci, T. **Cast metal vs. glass fibre posts: A randomized controlled trial with up to 3 years of follow up.** *J Dent.* 2014 Feb 12. pii: S0300-5712(14)00042-6. doi: 10.1016/j.jdent.2014.02.003. [Epub ahead of print]

Objective: This randomized controlled trial compared the survival of glass fibre and cast metal dental posts used to restore endodontically treated teeth with no remaining coronal wall. **Methods:** Fifty-four participants (45 women) and 72 teeth were evaluated during a follow-up period of up to 3 years. Teeth were randomly allocated to the glass-fibre and cast-metal post groups. All teeth were restored with single metal-ceramic crowns. Survival probabilities were analyzed using Kaplan-Meier statistics ($p \leq 0.05$). **Results:** The 3-year recall rate was 92.3% and the survival rates of glass fibre and cast metal posts were similar (97.1% and 91.9%, respectively; $p = 0.682$). Four failures were observed: two glass fibre posts in a premolar and anterior tooth de-bonded, one glass fibre post in a premolar de-bonded in association with root fracture, and one root fracture occurred in a molar with a cast metal post. **Conclusion:** Glass fibre and cast metal posts showed similar clinical performance in teeth with no remaining coronal wall after 3 years. **Clinical significance:** Posts are used to restore most endodontically treated teeth with no remaining coronal wall. This randomized controlled trial, one of few to compare glass fibre and cast metal posts in such teeth, showed that post type did not significantly influence the survival of restorations. These results can help dentists respond to the important question of how best to rehabilitate endodontically treated teeth with no remaining coronal wall.

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Schmitter, M, Hamadi, K, Rammelsberg, P. **Survival of two post systems--five-year results of a randomized clinical trial.** *Quintessence Int.* 2011 Nov-Dec;42(10):843-50.

Objectives: To assess the survival rate of two different post systems after 5 years of service with a prospective randomized controlled trial. **Methods:** One hundred patients in need of a post were studied. Half of the patients received long glass fiber-reinforced posts, while the other half received long metal screw posts. The posts were assigned randomly. After at least 5 years (mean, 61.37 months), follow-ups were established. When a complication occurred prior to this recall, the type and time of the complication was documented. Statistical analysis was performed using the log-rank test and Kaplan-Meier analysis. Additionally, a Cox regression was performed to analyze risk factors. **Results:** The survival rate of fiber-reinforced posts was 71.8%. In the metal screw post group, the survival rate was significantly lower, 50.0% (log-rank test, $P = .026$). Metal posts resulted more often in more unfavorable complications (eg, root fractures); consequently, more teeth ($n = 17$) had to be extracted. The Cox regression identified the following risk factors: position of the tooth (anterior vs posterior teeth), degree of coronal tooth destruction, and the post system (fiber-reinforced post vs metal screw post). Fiber-reinforced restorations loosened in several patients; in some of these cases ($n = 6$), patients did not notice this, leading to the extraction of teeth. **Conclusions:** Long metal screw posts should be used with great care in endodontically treated teeth. Besides the selection of the post system, other factors influence the survival of the restoration.

Scotti, R., Malferrari, S., Monaco, C.. **Clinical evaluation of quartz fiber posts: 30 months results.** *J Dent Res.* 81 IADR Abstract #2657; 2002 (www.dentalresearch.org)

The usage of the aesthetic fibre posts is progressively growing for their promising clinical performances and their good aesthetic characteristics. **Objectives:** the aim of this 30 months in vivo study is to evaluate the clinical success-rate of 180 endodontically treated teeth, restored by the usage of “white” quartz fiber post and finalized with the metal-ceramic crowns and all-ceramic crowns. **Methods:** all the teeth were endodontically treated according to the recent techniques. In accordance with the international literature, to achieve clinical information, parameters were recorded in diagrams. Posts used were Aestheti-Plus (RDT, St. Egrève, France) in combination with All-Bond 2 adhesive resin (Bisco, Schaumburg, IL, USA) and C&B Resin Cement (Bisco, Schaumburg, IL, USA), the build up of the core was performed with the composite material Core-Flo (Bisco, Schaumburg, IL, USA), or Bis-Core (Bisco, Schaumburg, IL, USA). The post and core restorations were evaluated after 2 weeks, 1, 3, 6, 12, 20 (Malferrari et al., IADR abstr #11; Rome 2001) and 30 months, recording the surviving rate. **Results:** three failures were observed, one was a cohesive fracture that occurred after two weeks, involving a margin of the composite restoration and two were adhesive fractures, that occurred after a couple of months, both located at the interface cement and dentinal walls of the canal. As all the failures occurred during removing the temporary it was possible to replace the restorations, that are still in place up to the present day. The 3 failures that occurred during this period do not show any relevance according to the statistical analysis with the Chi Square test ($p=0.246$). **Conclusions:** according to these results, and considering the limits of this study, the quartz posts, within a 30 months period of rehabilitation of endodontically treated teeth, clinically performed with success.

Scotti, N, Eruli, C, Comba, A, Paolino, DS, Alovise, M, Pasqualini, D, Berutti, E. **Longevity of class 2 direct restorations in root-filled teeth: A retrospective clinical study.** *J Dent.* 2015 May;43(5):499-505. doi: 10.1016/j.jdent.2015.02.006. Epub 2015 Feb 17.

Objectives: To evaluate retrospectively the longevity of endodontically treated teeth restored with direct resin composite without cusp coverage, with or without the insertion of fibre posts. The null hypothesis was that direct restorations with fibre posts perform better than those without fibre posts. **Methods:** Patients recruited for this study were treated in the Department of Cariology and Operative Dentistry, University of Turin, between 2008 and 2011. In total, 247 patients with 376 root treated posterior teeth, restored with direct resin composite, were recalled for a control visit. Only second-class cavities were considered. Two groups were defined based on the absence (Group A) or presence (Group B) of fibre post. Failures and complications, such as periodontal failure, endodontic failure, tooth extraction, root fracture, post fracture, post debonding, replacement of restoration, crown displacement, and coronal-tooth fracture, were noted. Functional restoration quality was evaluated following the modified USPHS criteria. Data were evaluated statistically with ANOVA. **Results:** Group A consisted of 128 patients with 178 restorations (88 premolars, 90 molars) with a median follow-up of 34.44 months. Group B consisted of 119 patients with 198 teeth (92 premolars, 106 molars) with a median follow-up of 35.37 months. Direct restorations with fibre

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posts were statistically significantly more functional (95.12% success) than those without fibre posts (80% success) because of less marginal discolouration, better marginal integrity, and higher restoration integrity. **Conclusions:** The null hypothesis was accepted because direct post-endodontic restorations with fibre posts performed better than restorations without posts after 3 years of masticatory function. **Clinical significance:** An evaluation of the longevity of post endodontic direct restoration would seem to enhance the fiber post insertion within a composite restoration to reduce clinical failures.

Signore, A, Kaitsas, V, Ravera, G, Angiero, F, Benedicenti, S. **Clinical evaluation of an oval-shaped prefabricated glass fiber post in endodontically treated premolars presenting an oval root canal cross-section: a retrospective cohort study.** *Int J Prosthodont.* 2011 May-Jun;24(3):255-63.

Purpose: This retrospective cohort study investigated the clinical effectiveness of preformed oval-shaped glass fiber posts in combination with a dual-curing composite resin core material in endodontically treated premolars presenting an oval root canal cross-section and restored with all-ceramic crowns over up to 45 months. **Methods:** The study population comprised 134 patients and 154 endodontically treated premolars, with varying degrees of hard tissue loss, restored by means of oval-shaped fiber-reinforced posts. Inclusion criteria were premolars presenting an oval-shaped root canal, symptom-free endodontic therapy, root canal treatment with a minimum apical seal of 4 mm, application of rubber dam, and the need for a post and core complex because of coronal tooth loss. Four groups were defined based on the number of preserved coronal walls after endodontic treatment and before core buildup. Survival rate of the post and core restorations was determined using Kaplan-Meier analysis, and statistical analysis was performed using the log-rank test ($P < .05$). **Results:** The posts and cores were examined clinically and radiographically. The mean observation period was 42.3 ± 2.7 months. The overall survival rate was 95.45%. Comparisons revealed that the difference between premolars with no coronal wall retention and premolars that had maintained one to four coronal walls was statistically significant ($P = .0006$). On the contrary, comparison between premolars with one and two residual walls was found to be not significant for the overall survival rate ($P = .0698$). **Conclusion:** A satisfactory clinical performance was observed for preformed oval-shaped glass fiber posts. Survival was higher for teeth retaining three and four coronal walls.

Signore, A., Benedicenti, S., Kaitsas, V., Barone, M., Angiero, F., Ravera, G. **Long-term survival of endodontically treated, maxillary anterior teeth restored with either tapered or parallel-sided glass-fiber posts and full-ceramic crown coverage.** *J Dent.* 2008 Dec 15. [Epub ahead of print]

Objectives: This retrospective study investigated the clinical effectiveness over up to 8 years of parallel-sided and of tapered glass-fiber posts, in combination with either hybrid composite or dual-cure composite resin core material, in endodontically treated, maxillary anterior teeth covered with full-ceramic crowns. **Methods:** The study population comprised 192 patients and 526 endodontically treated teeth, with various degrees of hard-tissue loss, restored by the post-and-core technique. Four groups were defined based on post shape and core build-up materials, and within each group post-and-core restorations were assigned randomly with respect to root morphology. Inclusion criteria were symptom-free endodontic therapy, root-canal treatment with a minimum apical seal of 4mm, application of rubber dam, need for post-and-core complex because of coronal tooth loss, and tooth with at least one residual coronal wall. Survival rate of the post-and-core restorations was determined using Kaplan-Meier statistical analysis. **Results:** The restorations were examined clinically and radiologically; mean observation period was 5.3 years. The overall survival rate of glass-fiber post-and-core restorations was 98.5%. The survival rate for parallel-sided posts was 98.6% and for tapered posts was 96.8%. Survival rates for core build-up materials were 100% for dual-cure composite and 96.8% for hybrid light-cure composite. **Conclusions:** For both glass-fiber post designs and for both core build-up materials, clinical performance was satisfactory. Survival was higher for teeth retaining four and three coronal walls.

Subramaniam, P, Babu, KL, Sunny, R. **Glass fiber reinforced composite resin as an intracanal post--a clinical study.** *J Clin Pediatr Dent.* 2008 Spring;32(3):207-10.

Restoration of primary incisors, which have been severely damaged by early childhood caries or trauma, is a difficult task for the pediatric dentist. With the introduction of new adhesive systems and restorative materials,

Fiber Post Clinical Studies

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alternative approaches for treating these teeth have been proposed. **Materials:** Ten healthy children aged between 3-4 years who had 28 grossly destructed primary maxillary incisors requiring intra canal retention were selected for the study. Following root canal treatment, either a Glass Fiber Reinforced Composite Resin (GFRCR everStick,, Finland) or an omega shaped stainless steel wire were placed as intracanal posts in these teeth. Flowable composite was used for cementation of posts and also to build up the coronal structure using celluloid strip crowns. Both types of intracanal posts were evaluated for retention and marginal adaptation at 1, 6 and 12 months. The data obtained was subjected to statistical analysis. **Conclusion:** GFRCR intracanal posts showed better retention and marginal adaptation than omega shaped stainless steel wire posts.