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Research Article

Rehabilitation of Mutilated Teeth - A Systematic Review

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Abstract

Statement of Problem: Dentists are commonly encountering the management/treatment decision of mutilated individual teeth

Aim: The aim of this systematic review was to analyse the materials and methods in the clinical scenario used for rehabilitation of individually mutilated teeth using post and core.

Materials and Methods: A PubMed search was carried out systematically to find randomized controlled clinical trials, case reports until December 2018 from January 2008, and issued in single language i.e English associated with rehabilitation of mutilated teeth. Evidence based tables were developed by assessing the quality, inclusion and exclusion criteria.

Results: A PubMed search identified 1646 articles. From 2008 to 2018, 696 articles were available. After assessing the titles, sub-titles, synopsis, and outline of the articles revealed that 658 were inapplicable and 40 seems to be applicable. Out of 40 articles, four randomized controlled clinical trials, 34 case reports. As stated by the great extent of facts, Glass Fiber posts showed better clinical success in long term follow up (RCT). Fiber posts showed better clinical success than metal posts in strength (Case reports).

Conclusion: Fiber glass posts showed excellent survival rates in clinical trials, with identical presentation as that of cast-post-and cores. Metallic posts also showed excellent clinical survival, but the allied failures were mainly irreparable. Majority of the data was chiefly found on invitro studies and to a lesser degree on clinical trials. The deficiency of long term follow up of randomized controlled clinical trials was the predominant obstacle to arrive at a convincing judgement. However, there is lack of documented evidence on gold cast post and core which is the limitation of this article.

Keywords: Caries; Coronal Fracture; Mutilated Teeth; Randomized Controlled Clinical Trials

Introduction

Background

Mutilated tooth is that tooth which is grossly weakened and badly broken down tooth where the volume of left over tooth shape is less than the amount of tooth loss. Mutilation of teeth is due to long standing caries or recurrent caries, over-zealous preparation and traumatic fracture of the tooth. Partial or complete coronal destruction of teeth is caused by the spread of decay underneath an existing crown.

Objective

The main objective of Conservative Dentistry and Endodontics is to identify the disease involving the dental, pulpal and periarticular structures and to retain the natural teeth with maximal function and pleasing aesthetics. Thus, restoring the health of the tooth. A good Prosthetic reconstruction of badly mutilated tooth following endodontic therapy is equally important treatment procedure as principally believed. When a coronal portion of tooth structure has lost in a large extent, a post can be

used. The principal purpose of Post is to aid in the retention for a core. It is a very challenging clinical scenario when there is need to rehabilitate severely destructed tooth predominantly to impart coronal filling. Rehabilitation of badly broken molar following successful endodontic therapy should be contributed by a sound coronal restoration. There are many techniques of restoring a badly broken molar tooth. It should ideally meet the necessary needs such as function and aesthetics [1].

This review highlights the role of dowel and core in the management of badly mutilated individual teeth.

Materials and Methods

The main evidence based research question of this review was which type of post is good in clinical scenario when it is used for rehabilitating individual mutilated teeth. A PubMed search was carried out systematically to find randomized controlled clinical trials, case reports until December 2018 from January 2008 and issued in single language i.e English associated with rehabilitation of mutilated teeth. STROBE's criteria was considered for analysing the studies [2]. Search keywords developed to find the articles were post and core used in Endodontics, rehabilitation of grossly decayed teeth, rehabilitation of individual mutilated tooth using post and core, rehabilitation of complete coronal destruction of teeth using post and core, treatment of grossly decayed teeth, management of grossly decayed teeth, treatment of compromised teeth.

Inclusion and exclusion criteria

Inclusion criteria

Mutilated teeth by caries, rehabilitation only for single or 2/3 teeth, trauma (where dentin replacement is required), *In vivo* studies conducted in humans, related to the question, Quantitative results provided, Published in English language.

Exclusion criteria

Full mouth rehabilitation including Worn out dentition (loss of vertical dimension), Congenital abnormalities, Developmental defects (Amelogenesis imperfecta, Dentinogenetic imperfecta (where full mouth rehabilitation is required), Fluorosis.

Results

A PubMed search identified 1646 articles. From 2008 to 2018, 696 articles were available. After assessing the titles, subtitles, synopsis, and outline of the articles revealed that 658 were inapplicable and 40 seems to be applicable. Out of 40 articles, four randomized controlled clinical trials, 34 case reports.

Figure 1

Randomized controlled clinical trials evidence based results analysis

Study	Materials and Methods	Control Group	Experimental Group	Follow-up Period	Results	Risk of Bias
Gbadebo OS, Ajayi DM, Oyekunle OO, Shaba PO 2014 [3]	40 ETT requiring post retained restorations randomly divided into two groups restored using a glass fiber-reinforced post (FRP) and stainless steel parapost (PP), each in combination with composite core buildups. The samples were examined radiographically and clinically. Categorical values- Fisher's exact test. descriptive statistical analysis- log-rank test .	Metallic post	Glass-fiber post	1 and six months	Glass FRPs performed better than the metallic post	Marginal defect was found in both metallic and glass-fiber post(potential failure of the restoration). Although this Was not found to be statistically significant based on short-term clinical performance. Low risk of bias

Sterzenbach G, Franke A, Naumann M 2012 [4]	Ninety-one subjects in need of postendodontic restorations received tapered titanium post or a tapered glass fiber-reinforced epoxy resin posts – where teeth with two or less remaining cavity walls . The test used was log rank test	Titanium posts	Prefabricated glass fiber-reinforced epoxy resin posts	Seven years	No statistical difference found	Failures were mainly because of incomplete ferrule effect. Lack of prior sample size determination. High risk of bias
Bitter K, Noetzel J, Stamm O, Vaudt J, Meyer-Lueckel H, Neumann K., *et al.* 2009 [5]	Ninety patients providing 120 teeth were selected. Three groups (n = 40) were defined based on the amount of Left out crown portion of dentin: the groups were one wall group, one coronal wall, no wall group, no wall which was exceeding 2mm above the gingival level and randomized in each group. Intervention in 2 groups (n=20) including subgroups no post and subgroups posts	No post	Fiber post	32 months	Teeth without post retention revealed a significantly higher failure rate (31%) compared with teeth restored with post retention (7%)	Lack of completely standardized conditions with type of teeth i.e anterior/posterior. High risk of bias
Karteva EG, Manchorova NA, Vladimirov SB, Keskinova DA 2018 [6]	Twenty-two patients who received endodontic therapy on premolars with a loss of one or two proximal walls. As stated by the restoration methods, premolars were allocated into groups: Metal post group,fiber-post group, and no post group. For the no post group, a dentinal core of fiber-reinforced composite was used. The McNemar test, marginal homogeneity test and Kruskal-Wallis test were used in the statistical analysis.	Metal post, Fiber post	No post with core of fiber-reinforced composite	6 to 12 months	There were no failures of the different posts used, but there was a progressive deterioration of the composite restorations	There was no proper experimental and control group. High risk of bias

Table 1

Analysis of the results of case reports (posts used for grossly decayed tooth)

Study	Type of tooth destruction	Post	Follow up period	Results	Risk of bias
Abuabara A, Costa RG, Morais EC, Furuse AY, Gonzaga CC, Filho FB 2013 [5]	Root perforation and severe internal resorption of maxillary central incisor	Glass fiber-reinforced post	30 months	Clinically-Good Radiographically-Not evaluated	High risk of bias
Kumar S, Rao A, Sheila K 2013 [6]	Gross destruction of the crown of the maxillary central incisor with periapical lesion	Anatomic fiber-post	Six months	Clinically-Good Radiographically-Good	Low risk of bias
Abuabara A, Costa RG, Morais EC, Furuse AY, Gonzaga CC, Filho FB 2013 [7]	Root perforation and severe internal resorption of maxillary central incisor	30 months	-	Clinically - Good Radiographically –Not evaluated	High risk of bias

Table 2

Analysis of the results of case reports (posts used for fractured tooth)

Analysis of the results of case reports (posts used for fractured fragment reattachment)

Study	Type of fracture	Post used	Follow up period	Results	Risk of bias
Alcantara CE, Correa-Faria P, Vasconcellos WA, Ramos-Jorge ML 2010 [10]	Fracture involving 2/3 of the crown	Dentin post	One year	Clinically - Good Radiographically -Good	Low risk of bias
Study	Type of tooth destruction	Post	Follow up period	Results	Risk of bias
Bajaj P, Chordiya R, Rudagi K, Patil N 2015 [8]	Complicated Crown-Root Fracture	Fiber post	Two years	Clinically-Good Radiographically-Not evaluated	Low risk of bias
Panduric V, Gabric D, Negovetic-Mandic V 2008 [9]	post-traumatic upper incisor reconstruction	Glass-fiber reinforced post	-	-	High risk of bias
Saito CT, Guskuma MH, Gulinelli JL, Sonoda CK, Garcia-Júnior IR, Filho OM., *et al.* 2009 [11]	Complicated crown-root fracture	Metallic radicular post	24 months	Clinically – good Radiographically – good	Low risk of bias
Patni P, Jain D, Goel G 2010 [12]	Fracture involving 2/3rds of the crown	Fiber post	Two years two months follow up	Clinically – Satisfactory Radiographically – Not evaluated	High risk of bias

Table 3

Analysis of the results of reviewers

Fiber posts demonstrated good clinical and radiographic results similar to the performance of Cast-post and cores. However, Metallic posts associated failures led to irreversible damage to the periodontium.

Discussion

The traditional methods of rehabilitation of mutilated teeth using Cast post with alloys of Gold, Cobalt chromium and Nickel-chromium have been seen to be clinically and radiographically successful. However, Metallic posts associated failures leads to irreversible damage which leads to the advent of Prefabricated posts such as (Metallic) Titanium, Stainless steel, Brass, etc. Recently Non-metallic carbon fiber posts were also used, but the conventional cast post fabrication is time consuming, poor esthetics, poor adhesion to composite resins, lack of radiopacity. Custom cast posts are more prone for root fracture, poor esthetics. Glass fiber post which is esthetically acceptable, elastic modulus same as that of dentin, fracture resistance is high. These are the advantages of glass-fiber post. However, there was no literature giving us a complete systematic review on clinical studies. So, the need for an assessment of the clinical studies of fiber post system. Hence, this study was conducted to analyse the materials and methods in the clinical scenario used for rehabilitation of individual mutilated teeth using post and core.

A PubMed search identified 1646 articles. From 2008 to 2018, 696 articles were available. After assessing the titles, subtitles, synopsis, and outline of the articles revealed that 658 were

inapplicable and 40 seems to be applicable. Out of 40 articles, four randomized controlled clinical trials, 34 case reports.

Theodosopoulou., *et al*. carried out a systematic review in 2009 to evaluate which type of post and core system is the most well-to-do when it is used in clinical scenario to re-establish root canal treated tooth. The review recognized Six Randomized controlled trials, two Case control trials and two CSs and they arrived at an opinion that carbon fiber in resin matrix posts are significantly more desirable than cast posts (precious alloy) (RCT). Glass fiber posts are significantly more desirable than metal screw posts (RCT) and comparatively better than quartz fiber posts (CCT). Carbon fiber posts are inferior than metal posts (RCT). Prefabricated metal posts are moderately more desirable than cast posts (RCT) [13].

Randomized controlled clinical trials results analysis

The results of determined four Randomized controlled trials were showed that none of the trials were applicable with the STROBE's list of items to describe RCT's of post and core. They were lacking in random sample of a population, allotment and its execution. Also, these trials did not describe the blinding method and adverse effects.

Out of four RCT's, all the short term results were good. However, one study (Guido Sterzenbach., *et al*. 2012) had a long-term follow-up of 7 years which showed that failure was because of the incomplete ferrule.

Analysis of the results of Case reports

Out of 34 case reports, 21 studies showed good results using fiber posts. However other studies also showed good results, but varied in the follow up period i.e from six months to two years.

Conclusion

Fiber glass posts showed excellent survival rates in clinical trials, with identical presentation as that of cast-post-and cores. Metallic posts also showed excellent clinical survival, but the allied failures were mainly irreparable. Majority of the data was chiefly found on invitro studies and to a lesser degree on clinical trials. The deficiency of long term follow up of randomized controlled clinical trials was the predominant obstacle to arrive at a convincing judgement. However, there is lack of documented evidence on gold cast post and core which is the limitation of this article.

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