



Dental Amalgam Against Composite Core in Endodontically Treated Molar Teeth

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ABSTRACT

The treated endodontic teeth are usually much brittle, because of the loss of structural integrity which is associated with the accessibility of preparation. However, the presence of ferrule has positive impacts on the process of resisting fracture of molar teeth that have undergone endodontic treatment. Therefore, since the endodontic treated teeth have brittleness, planning for treatment will thus be determined by some factors such as tooth structure as well as the functional demands.

Keywords: Amalgam, Composite, Post and Core, Root canal treatment.

Introduction

This research entails reviewing the various literature associated with differences that can be witnessed in the amalgam material and the composite core in molar teeth that are treated endodontically. Various literature has been reviewed to provide an overview of the endodontic treatment of the molar teeth and amalgam restorations of the molar teeth. Also, through the literature review the various approaches that are employed in the process of treating molar teeth endodontically.

Endodontic treatment

Endodontic treatment is common in the teeth that are significantly affected by multiple repeat restorations, caries or fracture. The teeth that are structurally weakened are usually further weakened by the procedures that are involved in endodontic treatment that is designed ensure optimal access and the necessary procedures for restoring the rebuilding

the tooth. The loss of the inherent dentinal fluid contained in the tooth can easily alter the properties of the tooth. Therefore, the endodontically treated teeth are said to be weaker with lower lifetime prognosis. The teeth that have undergone endodontic treatment usually require special considerations that are necessary for the final restoration especially in the situation where there has been an extensive change in the tooth structure (Aquilino and Caplan, 2002). The special need that involves the endodontic treatment involves adequate retention for ensuring maximum resistance and final restoration of the tooth. The resistance and retention features are equally important in the final restoration where they are offered to as the anchorage. This is because they ensure that there is adequate anchorage and adequate strength while ensuring that the necessary clinical conditions.

The restoration that is necessary for the endodontic treatment of the molar teeth has been full of

controversial in the entire dentistry field. The contradictions can be entirely related to the materials used in the restoration process and the clinical procedures that need to be followed especially the situations when the fractures are related. There have been some changes in the process of restoring the molar teeth that have undergone endodontic treatment especially about the composite resin materials, adhesive techniques, indirect ceramic materials and fiber posts (Möllersten Lockowandt and Lindén, 2002). While focusing on the relevant benefits of bio-economy of the periodontal tissues, the conservation of the bonded techniques do assists clinicians in the process of choosing the necessary restoration of molar teeth that have undergone endodontic treatment.

Bio-economy of the dental tissues

There has been a direct relationship that has been established between the fracture resistance and tooth structure. The prognosis of the root filled molar teeth is said to entirely rely on the level of success of the endodontic treatment and the dentine tissue remaining. There are certain mini-invasive approaches that need to be followed in the process of treating molar teeth endodontically. During the endodontic treatment of the molar teeth, it is important to ensure a reduction in the removal of dental tissues that are considered healthy especially during endodontic therapy. Besides, it is important in the process of ensuring that conservative procedures are guaranteed in the process of canal obturation and irrigation (Sadan, 2008). The molar life cycle can be improved through conservative restoration with limited osseointegrated implants. Ensuring radicular tooth structure and intact coronal can be important in the maintenance of cervical tissue aiming at creating ferrule impact on the molar teeth. Bio-economy of the periodontal tissues are considered crucial in the process of optimizing the biomechanical behavior of the molar tooth that has undergone restoration. The conservation approach that is employed in the cavity restoration and preparation can include the surgical crown lengthening.

The reinforcement of the dental tissues has been possible through the adhesive restoration of the molar teeth and conservative bonded restorations where they are preferred as compared to the traditional commonly used metal crowns. The best approach that can be employed in the process of restoring the endodontically treated molar teeth is the one that can ensure minimization of the tissue sacrifice. The minimization of the tissue sacrifice is mostly targeting the cervical area aiming at creating ferrule effect. Adhesive procedures can then be used in strengthening the tooth structure while optimizing the restoration retention and stability (Siso, et al. 2007). The use of core and post materials especially with the physical properties that are close to the natural dentin. Chromatic integrations associated with adhesive restorations do offer appreciable outcome where the “chameleon effect” is said to be excellent especially for the posterior teeth but not molars. In the endodontic treatment of the molar teeth, it is crucial to guarantee the aesthetic restoration with minimized invasive performances. The healthiness of the periodontal tissues can be assured through the use of adhesive restoration while emphasizing on the oral hygiene techniques and professional inspections. It can be easy for one to diagnose marginal leakage in the treatment of the molar teeth hence ensuring early treatment is done. The use of indirect composite restoration can be crucial in allowing replacement and repair that forms an interim stage in the process of placing full crown aiming at preserving residual molar tissues necessary for the endodontic treatment. The use of composite overlay is an important restoration that ensured future re-treatment of molars especially the root canal and an option for treating dubious prognosis (Sadan, 2008). Also, the use of the single material in the process of direct restoration in building up and production overlay has some ergonomic advantages. The use common dental technician procedures especially for the inlay execution can be considered simpler than the full crown where these economic advantages are for both dental office and the patients.

Amalgam restorations

There has been increased use of the amalgam as the direct restoration due to the various practical, ergonomic and clinical advantages. Amalgam is an economical material that does ensure the stability of the coronal seal that can allow for treatment. It has been considered suitable for medium term restoration especially for the young patients where there is uncertain prognosis. The use of Onlay amalgam in the intraarticular retentions has been considered to be effective and conservative compared to the full crown. Cuspal coverage of the molars does ensure that there is protection against the possible biomechanical stress that does ensure prevention of vertical fractures. The use of amalgam has been posing numerous limitations that can include the intrinsic rigidity of the used material and also the change in size that can be possible through thermal expansion during the hardening stage of the molar teeth while undergoing treatment. The extremes of moist environments do result in stress especially on the dental tissues causing micro-cracking of the molar teeth (Siso, et al. 2007). The introduction of some composite materials that can include silver amalgam followed immediate replacement due to unproven toxic problems and other limitations that can include oxidation, corrosion, galvanic currents and gum tattoos.

The adhesive techniques have been preferred due to the strengthening and conservative restorations of the healthy tissue. The alternative for amalgam is gold restoration that is considered to be of high quality and noble. Gold partial crowns have been considered important in ensuring conservative protection against any stress that is bio-mechanical in nature and ensuring long term reliability. Despite the renowned durability of gold restorations, their use has been declining due to aesthetic limits. However, gold has remained as among the best materials of choice for the posterior teeth especially at the situations that aesthetics are not considered as the major issue of consideration. Molars are said to be best situated for the gold restoration especially when there is limited interocclusal space. The restoration can be either indirect or direct that entails placing restorative materials that are

necessary for molar teeth restoration (Sadan, 2008). It can also entail bonded composite that is directly restored as the conservative option possible to achieve. Any posterior tooth that has endodontic access to preparation where no structural loss can be experienced using conservative bonded restoration. Marginal ridge is mainly used in reinforcing anatomical structure where preservation of the structure is considered crucial.

Endodontic treated tooth characteristics

The endodontic teeth restoration has been a challenge to many dentists where they have been working to was looking for the best approach for restoring the molar tooth. However, there are still some questions as well as the opinions which are contradicting which have remained concerning the clinical procedures and also the materials which have been used by the dentists in the process of restoring these teeth when there are fractures that form on them. As a result of these contradictions, research was thereby done relating to the Medline database concerning the studies which have been made public for the last ten years, which made use of the major words such as non-vital teeth, or the pulpless teeth, dental pins as well as the post-and-core technique (Siso, et al. 2007).

Wagnild and Mueller, (2004) conducted a study where they asserted that the resistance fracture of the non-vital treated teeth were therefore restored through following various principles as well as materials. The fractures are usually mostly found in the pulpless teeth as compared to the teeth which have the vital pulps, even though some of the researchers have comparatively compared the difference that exists at the incidence of fracture between the non-endodontic treated teeth and the endodontic treated teeth for the patients. However, there is a study which related the high incidence of the teeth which were non-endodontic treated in the patients, to many have been caused by either their diet patterns or through their chewing habits which include the habit of chewing the bones of a meet. Moreover, various factors such as sex, age, and also the dental arch have also contributed towards the same incidence of fractures (Wagnild and Mueller,

2004). For instance, there was an observation which was observed relating to the incidence of fractures whereby the observers drew a conclusion that the cases of fractures in the teeth was 1.4 times more in male patients as compared to the female patients.

Belli, et al. (2005) made an observation that the majority of the fractures in teeth usually occur at the age of between 40 years to 49 years among the age group of men. While at the age group of women the incidences for the fractures in teeth mostly occur between the ages of 50 years to the age of 59 years. In general view, the researchers mostly carried out their research in order to test for the possible reasons as to why the fractures still existed in the teeth which were endodontic treated. Belli, et al. (2005) made an argument that the loss of water through the pulpless teeth could greatly have effects on the teeth. However, some of the studies conducted concerning the properties for the teeth such teeth hardness, elasticity modulus of the teeth as well as the compression strengths which usually exists in the vital pulp. Also in the pulpless teeth showed that these properties were modified in such a way that only a few of the properties could have effects on the fracture resistance of the teeth.

Sadan, (2008) noted that during the past, the endodontic treated teeth were usually considered to be more brittle because of the structural change in the dentin of the teeth which resulted in the loss of water. As well as the collagen which cross-links after the endodontic treatment, which is sometimes known for the loss of structural integrity. This is mostly related to the access preparation results in the rise in the deflection of the cusps during the time for functioning, which eventually results in high occurrence of fractures in the teeth. Through the consideration of the most endodontic treated teeth, there are missing structures of the teeth which are usually caused by the carriers or the already existing restorations, which are related to the endodontic access preparations (Wagnild and Mueller, 2004). Moreover, it is quite difficult to establish the structure of teeth when there are many cases for the occurrence of fractures which mostly depend on the structural change in the dentin or through missing tooth structure. Additionally, another issue which is

also related to the endodontic treated teeth is about the micro-leakage and also the bacterial contamination of teeth which mostly takes place when the restoration of teeth is not immediately made. Therefore, the utilization of the bonded restorations should be considered well to avoid the micro-leakage.

Treatment planning

Even though there has an extensive study concerning the endodontic treated teeth, the plan for treatment and also the materials for the restoration those teeth have remained a controversial. There are difficulties which are experienced during the process of determining the plan for treatment have been clearly shown through the questions asked by the various specialists concerning a better treatment of a fracture in a lateral incisor, thus leading then to get various strategies of the treatment which were quite different when based on the literature. Therefore, the best way for the restoration of these teeth has yet not been achieved by the dentists and also the clinicians (Sadan, 2008). Moreover, various criteria should be evaluated during the selection of the material as well as the technique that should be employed during the restoration of the endodontic treated teeth. However, the structure of the coronal tooth and the functional requirement are also significant factors which should also be considered in the process of making the decision about the treatment planning.

Functional requirement

The replacement of a tooth in the arch is an aspect that is required to be considered when the dentists are choosing the materials as well as the techniques to be used in the process of restoration of the pulpless teeth since different forces exist between the interior region and the posterior regions. Salameh, et al. (2007) in their research findings showed that there were more mandibular first molars as compared to the maxillary first molars. Therefore, the researchers related more mandibular first molars to the flat roots present in the molars. Moreover, Salameh, et al. (2007) made an observation that the longitudinal fractures of the

root were most common where the teeth had narrow dimension just like molars in the upper jaw.

Piovesan, et al. (2007), made an observation that canines were the only teeth which were least susceptible to fracture while the incisors teeth, where only susceptible to the fractures when they are subjected to the endodontic treatment. The difference that exists regarding the forces between the anterior teeth and the posterior teeth is as a result of the subjection of the posterior teeth to the vertical forces. The anterior teeth should consequently make resistance to the shearing types of forces, therefore increasing the post required to ensure distribution of the forces to the rest root parts of teeth, thus avoiding fractures.

Remaining tooth structure

The planning for the treatment of teeth is usually based depending on the remaining tooth structure. However, there are various studies which usually relate the loss of a tooth structure, in the determination of the purpose of the root posts to retain a core and therefore distribute stress. Even though the majority of the professional dentists believed in the past that, posts could make the treated endodontic teeth much stronger (Salameh, et al. 2007). Moreover, the root posts are mostly used under only a requirement to maintain a core during a circumstance when the coronal structure is missing.

Salameh, et al. (2007) conducted a study that carried out a comparison about the resistance of a fracture in the tooth which is restored or not restored with the crowns usually presented a greater rate of success in crowned teeth. Krejci, et al. (2003), gave an argument that despite the presence of other forms of coronal coverage which includes; gold, ceramic or even a composite resin. Coronal coverage also offers protection against the teeth fractures, there is no actually a single report concerning the literature which supports these forms of coronal coverage in the restoration of the posterior teeth. However, various considerations raise up concerning the use of crowns in endodontic treatment of teeth which led to the restoration with fiber posts as well as the composites which were performed by some of the

researchers who ended up relating to no merits which were achieved as a result of making use of the metal and ceramic crowns. Fernandes and Dessai, (2001) gave an argument that the rate of clinical success of the endodontic treatment of molars had a restoration of the cusp preservation with the fiber posts together with the direct composite restorations which were almost equal to the treatment of the whole coverage within the crown which was made of a metal-ceramic.

In another study which was also conducted by Cleen, (2013) carried a comparison between the type of material used in the process of restoring a crown. The researchers gave out a report that the success rate for the restoration of teeth is usually determined by the kind of material which is used in restoring the crown. For instance, the success rate for the cast restoration was almost 91.7% while the success rate of the amalgam restoration is around 83%. Therefore, the decision made concerning the use of a crown usually depends on the functional requirement and the teeth structure since the teeth that had their cusps preserved did not require the present low fracture resistance.

Uses of posts

However, even though some of the researchers relied on the past that various posts could develop the fracture resistance in endodontic treated tooth. In the present days, it is quite different in that the post space may instead give rise to the chances of a root fracture. Therefore, posts should be thus made use of when there is no alternative option which is available for retaining the core. Moreover, Pierrisnard, Bohin and Renault, (2002) gave another argument that the utilization of the root posts usually depends on the amount of the structure of the coronal tooth and also the functional requirements. These researchers conducted various studies where they related the endodontic treated teeth with restoration or even without posts. Additionally, there are various metal and also fiber posts that are accessible in the market but however the indication of these materials is quite different. In accordance to Butz, et al. (2011) the fiber posts to the direct resin restorations is which are faster

options in conserving the tooth structure which is remaining. Apart from the study which conducted the comparison of the longevity of endodontic treated teeth which were restored with the fiber posts, and the teeth which were restored by using composite resin. A conclusion from the study was drawn which showed that the restoration which was made from fiber posts were more efficient as compared to the teeth. This was restored using amalgam in the prevention of root fractures, but on the other side, the teeth were restored using the fiber posts were now less efficient in the prevention of the secondary carriers. However, when a post is used in the restoration process of teeth, it is important to consider the selection of a post which is suitable to be used. There are some of the metallic posts as well as the ceramic customs which are usually made of metal fiber, a glass fiber or even a carbon fiber. The both tooth structure and the functional demands are the key factors which are mostly considered when selecting a post. However, there is very less radicular tooth structure which requires a fiber post made of carbon or glass, since they possess an equal modulus of elasticity like the dentin thus forces will be distributed equally in the root of a tooth hence resulting in minimum fractures of the root. In the year 2009, Monga, Sharma and Kumar tested the use a fiber post which was made out the carbon in patients. Therefore, he found just the same results to control teeth. The results showed that carbon fiber post was an alternative system for the conventional post systems.

Situations of using endodontic post

The moment large portion of the crown is damaged it is usually difficult to ensure sufficient anchorage for restoration in the dentin remaining. Endodontic posts are then useful during the cases of severe loss of coronal dental tissue that can be caused by fractures, decay, or damage of iatrogenic indicating the need for a full crown (Mohammadi, et al. 2009). Despite the necessity of endodontic posts, careful assessment is crucial for looking for the possibilities of avoiding endodontic posts. Some of the reasons that endodontic posts need to be avoided whenever

possible can include the risks of stripping especially when inserted in curved and thin roots.

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