



Reevaluating the Guidelines in Endodontics Are the Existing Guidelines Correctly Addressing the Topic Including the Recent Improvements of the Techniques and Materials? A Systematic Review

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Abstract

The aim of this review is to highlight if the available guidelines remedy the contemporary developments of regenerative endodontics whether it is from a technical or a material aspects based on Evidence, and its implementation.

Methods: A web-based research on MEDLINE (www.pubmed.gov), Cochrane, Scopus, journal of endodontic, international journal of endodontic was done for collecting data for this review.

Results: For This review we screened 80 articles to get the desired knowledge update and only relevant information was compiled and Based on the previous guidelines from the official organizations, position statements, case series, and other scientific research we find that the current guideline does not include regenerative endodontic as a choice of treatment and there is no official guideline that could help the clinicians in their practices, therefore from evidence based case reports it appears that regenerative endodontic could be a treatment for mature permanent teeth however Because of the lack of failures cases that have been reported, it is not yet possible to predict its failure rate an official guideline is needed to determine whether this method is successful.

Keywords: Endodontic Guidelines; Regenerative Endodontics; Position Statement Standards Root Canal Treatment; Vital Pulp Therapy; Dental Trauma; Position Statement

Introduction

Over the past decade, clinical guidelines have increasingly become an integral part of any clinical practice, in which it rules the operations in hospitals, clinics or any other medical establishment. It is defined by many institutions as a document with the aim of guiding decisions and criteria regarding diagnosis, management, and treatment in specific areas of healthcare [1]. Zhicheng Wang, *et al.* defined the guidelines also as “any document containing recommendations for clinical practice or public health policy.

A recommendation tells the intended end user of the guideline what he or she can or should do in specific situations to achieve the best health outcomes possible individually or collectively [2], thus the production of any high quality guidelines is challenging for any organization as there are numerous challenges these include the formulation of recommendations on complex interventions.

In 2007, the world health organization (WHO) established the guideline review committee (GRC) in order to ensure that the WHO guidelines meet the highest international standards and contain trustworthy and implementable recommendations [3] A recent WHO evaluation, concluded that although the GRC plays a positive role in quality control of guidelines, these guidelines are frequently too long and too technical, dissemination needs to improve, and more derivative products are needed for specific audiences.

The greatest benefit that could be achieved by the guidelines is to improve health outcomes. In addition to any Guidelines that promote interventions of proved benefit and discourage ineffective ones have the potential to reduce morbidity and mortality and improve quality of life, at least for some conditions [4].

During the past few years in dentistry, Endodontics have changed tremendously from a technological aspect or theoretically

as well especially with the use of regenerative endodontics therapy that had increased significantly all over the world [6] however the guidelines currently in use are generally outdated and they are not keeping up with the aforementioned progress.

According to the American association of endodontics (AAE) position statement: the definition of regenerative endodontic is "its study and practice encompass the basic clinical sciences including biology of the normal pulp; the etiology, diagnosis, prevention and treatment of diseases and injuries of the pulp and associated peri radicular conditions" [7].

Regenerative endodontic therapy is an exciting and developing field in endodontics in which the treatment of immature permanent teeth with infected root canal systems using regenerative endodontic protocols often results in continued root maturation and apical closure. These protocols generally involve disinfection of the root canal and the introduction of a blood clot and/or stem/progenitor cells into the root canal space, which is then restored with a microorganism impregnable material, allowing tissue repair and further root maturation [24,25].

The current endodontic therapy is based on the concept that disinfected root canals should be sealed with as little residual space as possible to minimize bacterial recolonization [10,11].

Even after using disinfected instruments during the root canal treatment some bacteria or bacterial colonies are left behind after root canal disinfection and instrumentation [12]. If dental pulp is regenerated, natural cells, lymphocytes, and macrophages are restored by blood vessels [13] and represent an innate immune system.

The primary goal of Regenerative endodontic therapy (RET) is the elimination of clinical signs/symptoms and resolution of apical periodontitis, secondly is Maintain or restore the health of periradicular tissues, Regaining vital and functioning tissue, increase continued root development (Length and thickness).

Based on the classification of Cvek that proposed that regenerative endodontics should be considered for teeth with incomplete root formation although teeth with near or complete root formation may be more suited for conventional endodontic therapy or MTA barrier techniques, however much is still not known about clinical and biological aspects of regenerative endodontics [18]. The difference between nonsurgical root canal therapy (RCT) and Regenerative endodontic therapy (RET) is that the disinfected ca-

nals are filled with biocompatible, nonvital foreign materials in the former therapy and vital tissue in the later therapy. Although these tissues are not true pulp tissue, they are the host's own vital tissue, which is inherited with immune defense mechanisms to protect itself from foreign invaders.

Therefore, RET are able to restore the vitality of tissue in the canals of immature permanent teeth that was previously attacked by infection or trauma.

The American Association of Endodontists (AAE) established a database in 1996 to collect regenerative endodontic cases submitted by endodontists (49); more than 100 cases have been collected to date, but the AAE has not yet established guidelines from the database.

But AAE's regenerative endodontics initiative has stimulated the development of multiple approaches for the revitalization of dental pulp in immature permanent teeth with pulp infections [15,16]. However, the AAE has limited its regenerative endodontics initiative to the revitalization of dental pulp and continuous root development in immature permanent teeth [17]. The vast majority of endodontic treatments are in adults with well-developed, mature permanent teeth. Each year, approximately 15.1 million root canal procedures are performed in the United States alone, primarily in adults (20). Although the AAE has suggested also the 'Clinical Considerations for a Regenerative Procedure' to help clinicians manage immature permanent teeth with necrotic pulp/apical periodontitis. However, it is still not a guidelines and given the rapid evolving nature of this field; 'clinicians should also actively review new findings elsewhere as they become available'. Increased root canal wall thickness and/or increased root length is considered as a desirable, but perhaps not essential goal of RET by the slandered of the AAE.

Other important institutions such as The European society of endodontics (ESE) had published a position statement in 2016 regarding the subject, in which it appears to consider the increase in root thickness and length as one of a number of success criteria in their position statement [9]. Thus there could be some contradiction between important organizations in the point of view or even sometimes in the method of treatment rendering difficult to make a guidelines.

RET is currently used to treat immature permanent teeth with infected pulps [8]. It has the potential to restore tooth vitality, increase thickening of the canal walls, and/or encourage continued root development.

According to the 'Clinical Considerations for a Regenerative Procedure' that was suggested by AAE, RET is recommended for only teeth with a necrotic pulp and an immature apex. However, Saoud et al. have demonstrated through several case reports that the use of REP could be extended to mature teeth in adult patients [19] and the results. The periapical lesions of 2 teeth were considered healed, and 5 other teeth revealed healing within the follow-up of 26 months.

Another recent development is the apical foramen size. Zhou et al. reported that it was shown that thickening of the canal walls appeared to increase the fracture resistance using fracture resistance testing, as it was thought that an apical foramen size of 1.1 mm is necessary for successful revascularization [21].

To date, there is no consensus on what are the optimal apical foramen diameters that promote dental pulp regeneration in either immature permanent teeth or adult mature permanent teeth. Apical foramen diameters in the range of 0.3–1.0 mm have been attempted in the previously cited apical revascularization cases in adults [22,23].

Thus, upon literature search, there is no data available regarding the guidelines correctly addressing all the topics including the recent improvements of techniques, materials for the clinician? and if they ever should be updated every once in a while?

Materials and Methods

To limit our research to relevant articles, the search was filtered using terms like: Review, published in the last 10 years and Dental journals. Keywords used for research were "guidelines".

We were able to find (61 articles), "regenerative endodontics therapy" (36 articles), "position statement" (16 articles), "Root Canal Revascularization on mature and immature" (9 articles). For every heading within the review, relevant articles were chosen and organized in order of publication date thus to follow topic closely. This review screened about 80 articles to get the desired knowledge update, references and only relevant information was compiled and chosen.

Conclusion

This paper reviews the issues and proposes strategies for updating the guidelines for clinicians, educators, and researchers in universities, hospitals and dental clinics. Based on the previous guidelines, position statements, case series, and other scientific

studies we find that the current guideline does not include regenerative endodontics as a choice of treatment and there is no official guideline that could help the clinicians in their practices, therefore, evidence-based case reports indicate that regenerative endodontics could be a treatment for mature permanent teeth as successful case reports and case series show. However, because of the lack of failures cases that have been reported, it is not yet possible to predict its failure rate. An official guideline is needed to determine whether this method is successful.

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