

Effect of Endodontic Bioceramic Sealer on Endo-perio Lesion (Literature Review)

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Abstract : Background: Endo-perio lesion primarily caused by endodontic and periodontal are the most commonly encountered conditions. The success of endo-perio lesion treatment depends on optimal root canal sealing. The development of calcium silicate based or bioceramic sealer is based on sealers with good biocompatibility, which promotes the formation of mineralized tissue and suitable physical properties. The biocompatibility of bioceramic sealer can affect cell proliferation, differentiation, migration, and apoptosis. Bioceramic sealer can stimulate osteogenesis and can increase cell viability. **Objective:** This study aims to determine the effect of endodontic bioceramic sealer on the healing of endo-perio lesion. **Methods:** The type of research was a literature review using qualitative analysis of case report journals using PubMed, Science Direct, and Google Scholar database for the 10 years, and followed by bias assessment using the CARE (Case Report Statement and Checklist). **Results:** The results showed that 9 journals had the same results on the use of bioceramic sealers in endo-perio lesions. The healing of endo-perio lesions is characterized by a reduction in pocket depth, alveolar bone repair, normal periodontal ligament space, reattachment of clinical attachment, and the healing of the sinus tract around apex. **Conclusion:** The use of endodontic bioceramic sealers may affect the healing of endo-perio lesions.

Keywords: bioceramic sealer, endo-perio lesion, endo-perio lesion healing.

INTRODUCTION

Endo-perio lesion can be defined as pathological communication between endodontic and periodontal tissues.¹ The formation of endo-perio lesion starts from pulp necrosis that spreads to oral cavity through the apical foramen, and can damage the periodontal ligament and adjacent alveolar bone as found in apical periodontitis or apical abscess cases.² Endo-perio lesion primarily caused by endodontic and periodontic are the most commonly encountered conditions.³

The results of Riskesdas 2018 showed that 57.6% of the population in Indonesia have dental oral problems with a caries prevalence of 88.8%. Pulp inflammation due to advanced dental caries is one of the dental and oral diseases with a high prevalence that

needs serious attention. Data shows that 52% of the world's population has at least one tooth with apical periodontitis due to pulpitis conditions with a higher prevalence rate in developing countries than developed countries.^{4,5}

The proportion of periodontitis problems in Indonesia according to the results of Riskesdas 2018 showed 74.1% and gingival abscess problems amounted to 14%.⁴ The prevalence of endo-perio lesion cases at the RSKGM South Sumatra Province 2022 in the research of Gusnico et al. including periapical abscess with sinus as many as 392 cases (71.01%), periapical abscess without sinus as many as 110 cases (19.93%), chronic apical periodontitis as many as 24 cases (4.35%), acute apical periodontitis of pulpal origin as many as 15 cases (2.72%), and radicular cyst as many as 11 cases (1.99%).⁶

The treatment needed to restore periodontal tissues in lesion that originated from endodontic problems is root canal treatment.² Root canal treatment is one of treatment for pulp disease by removing vital pulp of necrotic pulp from the root canal and replacing it with root canal filling material.⁷ The success of endo-perio lesion treatment depends on efficient disinfection and optimal root canal sealing.⁸

Root canal sealer functions to fill voids and irregularities within the root canal, accessory canals, and spaces between gutta-percha used in lateral condensation. Root canal sealer can also act as lubricants during the obturation process.^{9,10} There are many root canal sealers available in the market with different chemical compositions and setting reactions. Sealers are divided into five groups based on their composition, which are zinc oxide eugenol (ZOE) based, calcium hydroxide based, glass ionomer based, resin based, and calcium silicate-based sealers also known as bioceramic sealer.^{11,12}

Bioceramic sealer have been available for use for the past 30 years and are increasing in the field of medicine and dentistry.¹⁰ In the field of endodontics, the first bioceramic was mineral trioxide aggregate (MTA) as a perforation repair and root end filling.¹³ Bioceramic has been developed and are available in several forms, such as alumina, zirconia, hydroxyapatite, calcium phosphate, mineral trioxide aggregate, and biodentine.¹⁴

Biocompatibility of bioceramic can be seen from its interaction with surrounding tissues that can affect cell proliferation, differentiation, migration, and apoptosis. The response of cells to bioceramic can determine the outcome wound healing and tissue repair.¹⁵ Shumilovich et al. and Pereira et al. stated that bioceramic sealers can heal

periapical.^{3,8} In the studies of Ja'apar et al. and Radwanski et al. stated that bioceramic sealer can increase the viability of human gingival fibroblast cells. This increase in cell viability over time indicates increased growth associated with regeneration of cell proliferation activity.^{12,16}

Gingival fibroblast can demonstrate their potential to differentiate into other cell types including osteoblast-like cells. This suggest that with proper stimulation gingival fibroblast have the potential to be used for regenerative periodontal treatments.¹⁷ Based on the description above, the author is interested in reviewing the literature with the aim of knowing the effect of endodontic bioceramic sealers on the healing of endo-perio lesion.

METHODS

The type of research was literature review using qualitative analysis of case report journals. This research was carried out after the proposal was approved by the supervisor and examiner at the proposal presentation. The population used in this literature review is endo-perio lesion. The intervention provided in this literature review is a bioceramic sealer. This literature review was conducted to determine the effect of endodontic bioceramic sealer on the healing of endo-perio lesion characterized by a reduction in pocket depth, alveolar bone repair, normal periodontal ligament space, reattachment of clinical attachment, and the healing of the sinus tract around apex.

The journal databases to be used are PubMed, Science Direct, and Google Scholar with inclusion criteria and exclusion criteria shown in table 1. The literature used in published in English within the last 10 years. Bias assessment in this study used the CARE (Case Report Statement and Checklist) guidelines. The data were extracted using and electronic data extraction form consisting of the components of study title, researcher, study type, publication year, sample, intervention, and study outcome. The data obtained will be synthesized qualitatively descriptive of the results of data extraction.

Table 1. Inclusion Criteria and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Journals with case report type of research	Journals with in vitro studies, in vivo studies, randomized controlled trial, cross-sectional dan systematic review.

Inclusion Criteria	Exclusion Criteria
Bioceramic Sealer Calcium silicate-based sealer MTA-based sealer Calcium phosphate-based sealer Journal with English language	Epoxy resin-based sealer

RESULTS

This literature review was conducted to determine the effect of endodontic bioceramic sealer on the healing of endo-perio lesions from journals published within the last 10 years. The results of research based on journal searches through the PubMed, Science Direct, and Google Scholar databases obtained 9 case report journals that discuss the effects of endodontic bioceramic sealer on the healing of endo-perio lesions. The data extraction and assessment of journal bias in this study were synthesized qualitatively and used case report journal research guidelines, namely CARE (Case Report Statement and Checklist).

The collected journals consisted of publication years 2015, 2019, 2020, 2021, 2022, 2023, and 2024. The number of research patient subjects from 9 journals amounted to 14 patients diagnosed with endo-perio lesions, because there were 2 journals consisting of 3 case reports with 1 patient each and there were 1 journal consisting of 2 case reports with 1 patient each. All patients with endo-perio lesions in 9 journals were given interventions in the form of endodontic bioceramic sealer.

DISCUSSION

Endo-perio lesions occur mostly in the productive age group of 30-45 years because they are related to lifestyle. diet, types of food and drinks consumed, and smoking habits.^{3,18-20} Bioceramic sealers used in treating endo-perio lesions are BioRoot RCS, Ceraseal, TotalFill BC, Bio C Sealer, MTA, MTA Fillapex, and Guttaflow Bioseal. BioRoot RCS and Ceraseal are bioceramic sealers that are often used because of their biocompatibility that can stimulate bone and periodontal tissue regeneration, have good antibacterial, remineralization and adhesion properties in the root canal, and have good sealing ability. BioRoot RCS has an advantage in its antibacterial properties, while Ceraseal has an advantage in filling ability and has lower solubility than BioRoot

RCS.^{8,18-24} In addition, MTA has been reported to treat cases of endo-perio lesions in permanent teeth with open apex.²⁵

Clinical findings from nine journals show the successful use of bioceramic sealers in treating cases of endo-perio lesions, due to the advantages of bioceramic sealer materials in the form of biocompatibility, antibacterial properties, good sealing ability, and osteoinductive properties that can stimulate osteogenesis. The healing of endo-perio lesions can be characterized by a reduction in pocket depth, alveolar bone repair around the apex, normal periodontal ligament space, reattachment of clinical attachment, and healing of the sinus tract around the apex.^{3,8,21,26}

CONCLUSION

The use of endodontic bioceramic sealers can affect the healing process of endo-perio lesion which can be seen from a reduction in pocket depth, alveolar bone repair around the apex, normal periodontal ligament space, reattachment of clinical attachment, and healing of the sinus tract around the apex. The success of bioceramic sealer is obtained from its biocompatibility, antibacterial properties, good sealing ability, and osteoinductive properties that can stimulate osteogenesis.

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