ADA CE Program ARTICLE 2

The effect of regenerative periodontal therapy in preventing periodontal defects after the extraction of third molars

A systematic review and meta-analysis

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ABSTRACT

Background. Periodontal defect on the distal aspect of mandibular second molars is a common complication after mandibular third-molar extraction. Researchers have proposed different procedures, but no evidence has shown that a single effective method can prevent or treat this complication.

Methods. The authors conducted a systematic review and meta-analysis to answer this clinical question: what is the effect of regenerative periodontal therapy on the periodontal tissue healing of the distal site of the mandibular second molar after impacted mandibular third-molar extraction compared with extraction alone without using any biomaterials during a follow-up period of at least 6 months? The authors conducted an electronic search for randomized controlled trials using MEDLINE, Embase, and other databases, and they assessed the quality of selected articles.

Results. Among the 1,083 eligible articles found in the initial search, 7 studies fit all of the selection criteria. All of these studies had a follow-up period lasting at least 6 months. The authors found that regenerative periodontal therapy was significantly more effective in gaining clinical attachment level or reducing probing depth at the distal site of the mandibular second molar than extraction without therapy (weighted mean difference of clinical attachment level gain, 1.94 millimeters [95% confidence interval {CI}, 1.56-2.31]; weighted mean difference of probing depth reduction, 1.67 mm [95% CI, 1.15-2.19]).

Conclusions and Practical Implications. The results of our systematic review and meta-analysis demonstrated that regenerative periodontal therapy effectively prevents the periodontal defect associated with impacted mandibular third-molar extraction. Clinicians should consider performing guided tissue regeneration when the defect is anticipated.

Key Words. Guided tissue regeneration; periodontal disease; third molars; evidence-based dentistry; outcome assessment.
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Clinicians remove more than 10 million partially or fully impacted third molars every year in the United States.[1,2] The indications for third-molar extraction include pain, inflammation, pathology associated with tooth follicle, nonrestorable tooth, facilitation of dental procedures, such as orthodontic treatments, and prevention of disease involvement on adjacent teeth.[3,4] The results of several studies have demonstrated that retained asymptomatic impacted third molars were associated with the periodontal pathology of the second molars.[5-8] The prevalence of a probing depth (PD) of at least 5 millimeters on the distal aspect of mandibular second molars was 5 times higher than in maxillary second molars when second molars had adjacent asymptomatic third molars.[9] Furthermore, the PD on the distal aspect

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of mandibular second molars progressed more easily in mandibular second molars than in maxillary second molars.[10] Routine mechanical debridement did not significantly reduce the PD at sites with a PD of 4 mm or greater between the mandibular second and third molars.[11] Therefore, many mandibular third molars are extracted to treat periodontal pathology or to prevent progression of periodontal disease at the mandibular second molars. However, investigators often found a periodontal defect on the distal site of the mandibular second molar after third-molar extraction.[12-15] According to the results of a retrospective study,[14] more than 40% of mandibular second molars had intrabony defect of at least 4 mm, and more than 50% of mandibular second molars had a PD of at least 7 mm even 4 years after third-molar extraction. The questions then become whether the relatively high prevalence of having a periodontal defect on the mandibular second molar after impacted third-molar extraction outweighs the treatment effect of extraction and whether this complication is preventable.

To prevent the residual periodontal defect distal to the mandibular second molar after partially or fully impacted third-molar extraction, investigators have proposed the following procedures: scaling and root planing on the distal site of second molar,[16-18] using a specific flap design during extraction procedure,[19,20] and performing regenerative periodontal therapy on the extraction site.[21,22] Regenerative periodontal therapy attempts to restore lost periodontal structures and functional attachment through the regeneration of cementum, periodontal ligament, and alveolar bone.[23] Clinicians can evaluate the outcomes by measuring changes of clinical attachment level (CAL), PD, and bony defect. Frequently conducted techniques of regenerative therapy include osseous grafting, guided tissue regeneration (GTR), and use of biologics (for example, growth factors, enamel matrix derivative, platelet-rich plasma). Space provision, wound stability, and cell induction are key factors in the periodontal regeneration that can be achieved by using these techniques.[24] Given that this procedure has promising clinical outcomes in treating general periodontal defects, regenerative periodontal therapy appears to be a practical and predictable treatment to prevent the periodontal complication after third-molar extraction.[25,26]

Investigators of studies evaluating the effectiveness of regenerative periodontal therapy on the prevention of periodontal defects on the distal site of mandibular third molars after the extraction of third molars have reported varying results.[21,22,27,28] The purpose of our study was to systematically review the literature and conduct a meta-analysis of data to assess the outcome of regenerative periodontal therapy in preventing the loss of periodontal tissue distal to mandibular second molars after the extraction of impacted mandibular third molars.

METHODS

Focused question. We developed our focus question by addressing the population, the intervention (or exposure), the appropriate control group (or comparator), the outcomes of interest, and the study design. Our question was as follows: what is the effect of regenerative periodontal therapy—including osseous grafting, GTR, use of growth factors, enamel matrix derivative, or platelet-rich plasma—on the periodontal tissue healing of the distal site of the mandibular second molar after impacted mandibular third-molar extraction compared with extraction alone without using any biomaterials during a follow-up period of at least 6 months?

Study selection criteria. We included only articles that were published in English and described prospective randomized or nonrandomized controlled trials. Each of the included studies had at least 2 patient groups, and the number of patients in each group was no fewer than 10. All of the patients in the included studies had undergone mandibular third-molar extraction. Patients in the regenerative therapy group received the regenerative periodontal therapy in the sockets after mandibular third-molar extraction, and patients in the control group had extraction sockets that had healed naturally without receiving any biomaterials. We included studies whose investigators reported the surgical method of extraction, the change of CAL, the PD of the distal site of mandibular second molars, or a combination of these, during a follow-up period of at least 6 months.

Search strategy. We conducted the search in electronic databases, including MEDLINE (PubMed), Embase, Web of Science, and Dental and Oral Sciences Source, from January 1960 to August 2015. Appendix 1 (available online at the end of this article) lists the search strategies we used in these databases.

In addition to the searches in electronic databases, we searched the archives of the following journals: *Journal of Periodontology*, *Journal of Clinical Periodontology*, *International Journal of Periodontics and Restorative Dentistry*, *Journal of Maxillofacial and Oral Surgery*, *International Journal of Maxillofacial and Oral Surgery*, and *British Journal of Oral and Maxillofacial Surgery*. Moreover, we screened the reference lists of selected articles to find additional articles that might fit the selection criteria.

Quality assessment. We assessed the randomized controlled trials (RCTs) using the Cochrane Collaboration's

ABBREVIATION KEY. **BPBM:** Bovine porous bone mineral. **CAL:** Clinical attachment level. **DBP:** Demineralized bone powder. **DFDBA:** Demineralized freeze-dried bone allograft. **GTR:** Guided tissue regeneration. **LC:** Lincomycin. **NA:** Not applicable. **PD:** Probing depth. **RCT:** Randomized controlled trial. **SRP:** Scaling and root planing. **WDCAL:** Weighted mean difference of clinical attachment level gain. **WDPD:** Weighted mean difference of probing depth reduction.