

Outcomes of Surgical Endodontic Treatment Performed by a Modern Technique: An Updated Meta-analysis of the Literature

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Abstract

Introduction: Numerous studies on outcomes of surgical endodontic treatment have been published to date. However, study designs, treatment protocols, follow-up periods, and inclusion and exclusion criteria have been extremely heterogeneous. Thus, inconsistent and confounding results have been reported. The aim of this systematic review of the literature was to assess the outcomes of surgical endodontic treatment performed using a modern technique, and to evaluate factors potentially influencing the outcome. **Methods:** Strict inclusion and exclusion criteria were adopted in order to identify randomized clinical trials, controlled trials, and prospective case series that studied surgical endodontic treatments. Treatment success rates were pooled, and the effect of various factors on treatment outcomes was evaluated. **Results:** In a follow-up of 1 year postoperatively, a successful outcome was achieved in 89.0% of patients. The outcomes obtained in studies using an operative microscope versus an endoscope were not significantly different, but both magnification devices were associated with significantly better outcomes than loupes. The use of MTA and of an operative microscope was associated with better outcomes compared with other retrofilling materials or magnification devices, respectively. **Conclusions:** Surgical endodontic treatment performed in a modern technique is a viable treatment option. The type of retrofilling material and magnification device may affect the outcome. Additional large-scale prospective clinical studies are needed to further evaluate possible predictors of success and failure. (*J Endod* 2013;39:332–339)

Key Words

Meta-analysis, modern technique, surgical endodontic treatment

One of the main goals of surgical endodontic treatment is to prevent the invasion of bacteria and their byproducts from the root canal system into the periradicular tissues of teeth with apical periodontitis (1, 2). Surgical endodontic treatment may be indicated for teeth with apical periodontitis, when a nonsurgical retreatment is impractical or unlikely to improve the previous results (3), or when a biopsy is required (4).

Modern surgical endodontic treatment (ie, the modern technique) consists of the use of magnification devices such as a dental operative microscope (OM) to enable a precise procedure with no or minimal bevel of root-end resection and the application of retrograde canal preparation with the aid of an ultrasonic tip to a depth of 3–4 mm (5). The advantages of the modern technique include easier identification of root apices, smaller osteotomies, and shallower resection angles that preserve cortical bone and root length (1). In addition, under high magnification and illumination, a resected root surface readily reveals isthmi, canal fins, microfractures, and lateral canals (1).

The modern technique has shown predictable clinical results (2). However, in numerous studies published in recent years on the modern technique, the treatment protocols were quite variable. Magnification was obtained by means of a dental OM (5–8), an endoscope (9, 10), or loupes (11–13), and root-end filling was performed using either mineral trioxide aggregate (MTA) (6, 10, 12), ethoxybenzoic acid (EBA) cement (5, 8, 10, 13), intermediate restorative material (IRM) (6, 12), or other materials (1, 14, 15). Patient selection criteria and treatment success criteria were also quite variable. Furthermore, the differences in study designs and treatment protocols make it difficult to evaluate the influence of various factors on the outcomes or to establish a widely accepted protocol for the modern surgical endodontic treatment. The aim of this study was to evaluate the outcomes of surgical endodontic treatment performed in a modern technique and to study the factors influencing the outcomes by means of a systematic review and meta-analysis.

Materials and Methods

Criteria for Considering Studies for This Review

This systematic review included clinical studies that reported the outcomes of surgical endodontic treatment performed using a modern technique in patients with apical periodontitis in endodontically treated teeth. The inclusion criteria were the following:

1. Studies were randomized controlled trials (RCT), controlled clinical trials (CCT), or prospective case series (PCS).

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