

Endodontic Surgery



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Opinion

In recent times, we have witnessed technological advances in almost all areas of health sciences, endodontic surgery is no exception and it has also made significant progress with the help of surgical microscopy and complementary treatments with the use of biomaterials. Endodontic surgery follows the same principles applied in any surgical procedure that in essence are asepsis and antisepsis without overlooking the previous treatment of root canal; without it would be impossible to achieve the desired success; facing periapical infectious processes are truly a challenge due to the type of bacteria isolated in that biological complex. Surgical endodontic therapy is a predictable method of treatment because of its high success rate, and it is the treatment of choice for most patients presenting with evidence of pulpal and periradicular disease [1].

In 1884 Farrar described a “radical and heroic treatment of alveolar abscess by amputation of roots and teeth,” and in 1897 Rhein’ was advocating “amputation of roots as a radical cure in chronic alveolar abscess.” G. V. Black,5 in 1886, was also advocating the total amputation of the individual roots of molars which were severely involved in periodontal disease with root canal filling of the remaining healthy roots [2].

The classic view that endodontic surgery is a last resort is based on past experience with accompanying unsuitable surgical instruments, inadequate vision, frequent postoperative complications, and failures that often resulted in extraction of the tooth. As a result, the surgical approach to endodontic therapy, or surgical endodontics, was taught with minimum enthusiasm at dental schools and was practiced by very few in private practices [3].

The concurrent development of better techniques has resulted in greater understanding of the apical anatomy, greater treatment success and a more favorable patient response. These developments marked the beginning of the endodontic microsurgery era that began in the 1990s.3 Today, endodontic surgery, in combination with root canal therapy, has become a remarkably successful method for the elimination of certain periapical pathoses [2].

The goal of endodontic treatment is to prevent or cure apical periodontitis (AP) caused by infection of the root canal systems of the affected teeth [1] or due to persistence of the primary infection or emergence of infection after treatment [2]. Periapical lesions are the most frequently diagnosed apical odontogenic pathologies in human teeth. The condition is generally described as apical periodontitis. The etiologic factor is the presence and colonization of microorganisms within the pulp canal system [1-3]. Bacterial stimulus cells cause intercellular mediators, humoral antibodies, and effector molecules to be released into the periapical tissues [4]. When bacteria colonize only in the apical ramifications of the root canal or outside the root canal or when pathosis is sustained by a periapical foreign body the surgical procedure effectively removes the infected site and enhances the chances of healing [3].

Apical ramifications, lateral canals, and isthmuses connecting main root canals have all been shown to harbor bacterial cells, which are also frequently organized in biofilm-like structures [4-6]. In their natural habitats, microorganisms almost invariably live as members of metabolically integrated communities commonly attached to surfaces to form biofilms [7]. The biofilm provides microorganisms with a series of advantages and skills including establishment of a broader habitat range for growth; increased metabolic diversity and efficiency; protection against competing microorganisms, host defenses, antimicrobial agents, and environmental stress; and enhanced pathogenicity [8].

In situ investigations [9-12] using optical and/or electron microscopy have allowed observations of bacteria colonizing the root canal system in primary or persistent/secondary infections as sessile biofilms covering the dentinal walls. Poor endodontic treatment allows canal reinfection, which may often lead to treatment failure [13]. Clinical signs and symptoms as well as radiographic evidence of periradicular lesions are usually associated with endodontic failure. When root canal therapy is performed according to accepted clinical principles and under aseptic conditions, the success rate is generally high. The host response is further characterized by bone resorption and an extraradicular infection resulting in radiolucency. An acute

apical periodontitis or periapical abscess is associated with clinical signs of inflammation and pain.

Frequent indications for endodontic surgery have been suggested though contemporary practice proposes that endodontic surgery should be achieved only if conventional endodontic re-treatment will not remove potential areas of canal infection such as in an un-instrumented portion of a canal or will have the potential to irreversibly injury the tooth for example root fracture following to post removal, or if previous re-treatment has not resulted in healing [14].

Apical periodontitis is one of the most common pathological conditions within alveolar bone. Apical periodontitis consists of an inflammation and destruction of the tissues around the root of the teeth caused by etiological agents of endodontic origin [14,15].

It is usually a sequel of an endodontic infection that turns the dental pulp into a necrotic tissue infected by autogenous oral bacteria. This infection usually occurs through dental hard tissue damage resulting from caries, clinical procedures, or trauma and it provokes an inflammatory process that stimulates the proliferation of the cell rests of Malassez in the periodontal ligament [15]. The development of apical periodontitis can occur due to different mechanisms, such as accumulation of osmotic fluid in the lumen, proliferation of epithelial cell rests of Malassez, or molecular mechanisms [16]. As a result, clinicians often make clinical and radiographic diagnoses, and the removed periapical tissues are seldom submitted for histopathological analysis [17]. Clinical and radiological evaluations alone cannot properly identify the type of lesion in the apical area [18,19].

Many factors are involved in the healing process of a periapical defect following endodontic surgery [20]. Amongst these, the 2 layers of the periosteum are very important because they may act both as a source of osteo-competent cells and as a barrier against the infiltration of epithelial cells into the healing site. However, in large defects the periosteum is often damaged by the infective process [21].

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