



## Current Endodontic Strategies

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### Abstract

Minimally invasive endodontics is a current concept whose purpose is to preserve the structure's resistance of the natural tooth by downsizing the access cavity and the taper of prepared canals. The current technologies in endodontics, such as CBCT (cone beam computer tomography), dental microscope, ultrasonic instruments, nickel-titanium instrument, as well as the single-cone technique, are useful tools in achieving this goal.

**Keywords:** Romania; Dental Microscope; Computer Tomography

### Introduction

The aim of an endodontic treatment is cleaning, shaping and filling the root canals to eliminate microbes, in order to prevent apical periodontitis. This procedure increases the likelihood of that a tooth can be maintained and function normally in the mouth for a longer period of time. It has been demonstrated that endodontically treated teeth are more prone to fracture depending on the amount of remained tooth structure. In the last years a new concept appeared: minimally invasive endodontics. The goal of this is to preserve as much as possible the tooth structures throughout endodontic therapy, including a smaller access cavity and the use of modified instruments, with smaller tip diameters and tapers and more flexibility.

Even though, for many years we had been taught to prepare access cavities with straight line access to the canals orifices, nowadays we're trying to maintain the pericervical area of the tooth because it's related with his functionality and long-term survival [1]. The traditional access cavity's purpose was an effective instrumentation and prevention of iatrogenic complications. Removal of the pulp chamber's roof and cervical dentin protrusions and widening of canals orifices was mandatory in order to obtain a direct access to the apical foramen. Also, the old Ni-Ti rotary instruments, because of their great tapers, needed a modification of the access cavity's form for safe instrumentation [2].

More than ten years ago, Clark and Khademi published their first article over a new way to perform access cavities sustained by

a case series evaluated on the endo-restorative principles. In their concept, pericervical dentin means the dentine located close to the alveolar crest [3]. In order for the pericervical dentin to transmit pressure from the occlusal table into the root, it depends on this 4 mm above and 4 mm below the crestal bone [4]. To achieve this, doctors are encouraged not to use round burs or Gates-Glidden burs, to protect from gouging the access and the coronal canal part [5].

### New directions in endodontics

All the developments in new materials, optics or instrumentation have helped doctors to create new strategies for a non-invasive approach regarding the endodontic treatment. The preservation of more dentine mass during access cavity preparation and root canal instrumentation is very important. Because of its unique properties, there is no material that can properly compensate the loss of dentine [6].

### Common approaches of the cavities preparation are

Contracted endodontic access, an alternative to traditional, increasing endodontically treated tooth structure preservation, including pericervical dentin.

The access cavity is guided and designed by the help of the CBCT and optical surface scans. A high-resolution cone-beam computed tomography (CBCT) scan is recommended to be taken before the preparation, to determine the exact location of the root canal [7]. The shortcomings of this kind of access are the small operating space, insufficient visible light, and may also cause apical transportation, ledge, and instrument fracture [7].

Ninja endodontic access is prepared by a point access in the central fossa [8].

The designed cavity have some disadvantages such as miscentralization of the root canal, leaving parts of the canal surface unprepared and also voids in the root canal filling [8].

Truss endodontic access for lower molars, aiming to target the canal orifices without breaking the dentine structure between the mesial and distal canals. It can lead to insufficient cleaning of the pulp chamber and also inferior debridement of the root canal system [9].

In order to preserve as much pericervical dentin as possible, we lose sight of certain aspects that can compromise the quality of endodontic treatment. Due to restricted visibility, cracks and additional canals are often missed. Also, the restricted space can lead to file fracture [10].

It has been shown that root fractures and endodontically treated teeth are related to stress during root canal shaping along with the use of disinfectants and the excessive pressure applied during root canal filling [11].

The complexity of the root canal anatomy should be taken into consideration when preparing root canal shapes that can be properly disinfected and obturated, also leaving enough tooth structure to strengthen the root. All kind of rotary or reciprocating instruments, with various thermomechanical treatments and geometric designs, are constantly manufactured in order to prepare the root canals with minimal dentin loss [12,13]. NiTi file current technology with increased torque fatigue and flexibility contributes to a safer and easier root canal instrumentation. Evaluation the performance of endodontic files is usually appreciated upon their ability to shape curved canals and to maintain the original anatomy [14-16].

In order to preserve dentine and decrease the stress in the coronal third of the root canal, many clinicians proposed instruments with smaller tapers and diameters for root canal instrumentation [17,18]. But the main problem of these kind of files was the ability of a proper disinfection. A lot of studies present proofs that bigger apical sizes improve the quality of disinfection, the removal of dentinal debris after instrumentation and lower the bacterial number, varying on which size diameter will obtain the best results [19,20]. But at meantime, many researchers concluded that the smaller tapers did not influence the cleaning of the root canals [21,22]. Currently, shaping with rotating or reciprocating files with small taper and diameters, in combination with powerful irrigation, leads to clean dentinal walls.

### Conclusions

- It is very important to reconsider the internal anatomy and surrounding structures of the tooth, by the use of preoperative CBCT, in this case also the radiolucent periapical areas could be detected in a early stage.

- The degree of root canal enlargement and improved irrigation methods for optimal decontamination of the endodontic system may preserve dentine structure and root integrity, not becoming vulnerable during access preparation, instrumentation and obturation.
- Further clinical studies have to validate the concept of minimal approach and maximize respect of the healthy dentinal structures, future research and clinical evidence is needed and implementation of proper protocols for predictable long term prognosis.

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