

# Clinical evaluation of a new laser enhanced ablation procedure (LEAP) in regenerative endodontics: a case report

Tugba Turk<sup>1</sup>  
Gianluca Gambarini<sup>2</sup>

<sup>1</sup> Ege University, Department of Endodontics, Izmir, Turkey

<sup>2</sup> Sapienza University of Roma, Roma, Italy

**Corresponding author:** Gianluca Gambarini  
email: gianluca.gambarini@uniroma1.it

## Abstract

A new laser enhanced ablation procedure (LEAP) has been recently proposed in order to maximize the efficiency of intracanal disinfection and minimize the risk related to the extrusion of the irrigating solutions during endodontic therapy. The LEAP technique is based on the use of a diode laser which activates a laser absorption solution containing indocyanine green (ICG). In the present study, the use of LEAP was suggested as a final irrigation procedure which utilizes a safer and more biocompatible approach, avoiding the use of sodium hypochlorite and the risk related to its use in teeth with resorption. A 13-year-old boy was referred for endodontic treatment of a symptomatic lower left incisor. Dental history revealed a previous trauma. At the radiological examination, internal external resorption and large apical lesion were observed. Following the traditional chemomechanical approach, the LEAP protocol was used as an adjunct to improve disinfection before a regenerative procedure. After one-year radiographic healing had occurred and revealed normal periapical structures. The resorption process was stopped, and the patient reported being free of pain and able to use the tooth normally.

**Key words:** Laser; LEAP; Root canal; Disinfection; Antimicrobial; Regenerative endodontics; Root Resorption.

## Introduction

The basic principle of endodontic therapy is based on the disinfection of the root canal system using a chemo-mechanical instrumentation approach (combining root canal instruments and syringe irrigation) and a final enhanced irrigation technique using antimicrobial solution activated by different types of energy, i.e. sonics, ultrasonics, lasers, etc. (1,2). Even if root canal instrumentation plays a significant role in canal disinfection and debridement (3,11,21), irrigation is often regarded as the most important part of the root canal therapy, in particular for the elimination (ideally) or significant reduction of root canal microbes. During and following instrumentation, irrigating solutions are currently used to improve the killing of and removal of microorganisms, removal pulp and debris, and new solutions and new devices have been proposed in the last decades to improve the efficacy and safety of this fundamental step (12). Several studies have shown the importance of abundant and frequent irrigation, the importance of activating the irrigating solutions inside the root canal system to allow them to ideally reach all the instrumented and non-instrumented endodontic spaces, the dentinal tubules and ideally eliminate all bacteria (16,20). This effort is necessary because the root canal systems are very complex (19) and it is not easy for an irrigating solution, even when using activation, to reach all these areas. Moreover, some enhanced irrigation techniques which are mostly used in combination with sodium hypochlorite increase the risk of extrusion of the solution beyond the apex. This procedural accident may lead to increased post-operative pain (8,9) but also to more serious complications, known as "a hypochlorite accident," These "accidents" are not very common in conventional endodontic therapies, but have been widely reported in several published scientific articles. Moreover in immature teeth, in teeth with wide open and resorpted apex, this risk is much more relevant (17).

## Authors

Tugba Turk - Ege University, Department of Endodontics, Izmir, Turkey

Gianluca Gambarini - Sapienza University of Roma, Roma, Italy



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