

# Pulp capping: advantages of using laser technology

G. OLIVI, M.D. GENOVESE, P. MATURO, R. DOCIMO

**ABSTRACT.** *Aim* Pulp capping represents the boundary between conservative and endodontic therapy. The importance of this technique, which considerably improves the prognosis of the tooth, justifies the quest for new techniques and technologies: the most recent literature reports more predictable results (approximately 90%) with cappings performed using laser of different wavelengths, compared to traditional procedures, which report a success rate of approximately 60%. The purpose of this work is to assess the efficiency of laser technology combined with the use of a self-hardening calcium hydroxide base in pulp capping procedures performed on decayed permanent teeth. **Materials and methods** This study was carried out on 34 patients, aged between 11 and 18 years (average 14,5) who needed pulp cappings for deep caries affecting permanent teeth (8 front and 26 back). They were divided into three groups based on the operative protocol employed: traditional technique, laser-assisted technique using Er,Cr:YSGG lasers (2780 nm) and laser assisted technique using Erbium:YAG lasers (2940 nm); all patients were asked to return for follow-up visits (anamnesis, vitality testing and intraoral x-ray) scheduled at 1, 3, 6, 12 months, 2 and 4 years; other 30 cases on adult patients (19 to 40 years, average 27,1), treated with the same methods, were used as control group. **Results** Traditional technique group showed a success of 63% (adult control group 50%); Er,Cr:YSGG laser-assisted technique showed a success rate of 80% (adult control group 80%); Erbium:YAG lasers laser-assisted technique showed a success rate of 75% (adult control group 70%). All age groups had good success rates with the pulp capping technique, regardless of the technique used. **Conclusion** Laser technology proved effective in improving the prognosis of pulp capping procedures on teeth affected by deep caries pathology.

**KEYWORDS:** Pulp capping, Calcium hydroxide, Erbium laser, Erbium-Chromium laser.

## Introduction

Pulp capping is the treatment that marks the boundary between conservative and endodontic therapy: retaining vitality greatly improves tooth prognosis, both from the biomechanical and aesthetic point of view, justifying the quest for new techniques aimed at increasing this procedure's success rate.

Reviewing the international literature we can see that the high success rates refer to capping procedures performed on front teeth affected by trauma, where the bacterial contamination is lower than that of molars treated for deep caries. Cvek [1978] reported a 93% success rate of pulp cappings and partial pulpotomies performed on fractured front teeth; during the same year, Haskell [1978] reported a success rate of 87% at 11 years, without reporting the kind of tooth involved, and following up less than half of the treated patients.

In the year 2000, Clement reported an average success rate of 73%, with differences between front and back teeth; Auschill [2003] documented an average success rate of 61% with differences in results between the front teeth (83.3%) and the molars (38.9%) also in relation to age; Riccitiello [2005] reported partial pulpotomy as the preferred treatment for exposed pulp of immature permanent teeth, saving endodontic therapy for all exposures on teeth with complete root formation.

On the contrary, more recent literature has shown more predictable results: approximately 90% in laser-assisted pulp cappings performed using different wavelengths (1064 nm, 2780 nm, 2940 nm, 10600 nm) [Santucci, 1999; Olivi, 2006; Jayawardena et al., 2001; Moritz et al., 1998], versus traditional techniques, which presented optimal results of approximately 60%.

Erbium lasers emit electromagnetic radiations in the medium infrared spectrum (2780-2940 nm); interacting preferably with water and hydroxylapatite, these lasers have an efficient ablation effect on both the soft tissues

University of Rome "Tor Vergata"  
Department of Pediatric Dentistry, Head: Prof. Raffaella Docimo  
e-mail: raffaella.docimo@ptvonline.it