Evidence-based dentistry on laser paediatric dentistry: review and outlook

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Abstract. Aim *The goal of paediatric dentistry is to provide preventive education to parents and patients as well as interception and therapy of dental diseases in a minimally invasive way using a stress-free approach. Different laser wavelengths are used for different applications following these minimally invasive concepts: argon, KTP, diode, Nd:YAG, and CO2 lasers are used for soft tissue applications and the erbium family is used for both soft and hard tissue procedures. This paper offers a revision and a discussion of the international literature, showing also some clinical procedures. related to these scientific studies. Soft tissues laser applications in Pediatric Dentistry include application in oral surgery as well as in periodontics and orthodontics. Laser applications on hard tissues include caries prevention and detection and application for sealing of pits and fissures. Also application for cavity preparation, carious removal and pulp therapy are discussed.*

Keywords*: Paediatric dentistry; Laser surgery; Frenectomy; Gingivectomy; Impacted tooth; Caries prevention; Caries diagnosis; Dental caries preparation; Dental trauma.*

Introduction

The goal of paediatric dentistry is to educate both children and parents about prevention in order to reduce dental pathologies in early and late childhood as well as in adolescence. The common objective is tissue preservation (preferably by preventing disease and intercepting its progress), this means performing treatment with as little tissue loss as possible. With the new techniques available (digital radiology with low radiation emission, diagnostic laser and the dental operative microscope) we can aim for both an early diagnosis and a minimally invasive therapy (ozone therapy, air abrasion, rotary instruments for micro-preparation and the laser). As reported by Martens and underlined by Gutknecht [Martens, 2003; Gutknecht et al., 2005] «children are the first in line to receive dental laser treatment» and based on the micro dentistry motto *filling without drilling*, we agree with the philosophy that laser-supported dental diagnosis and treatment is crucial for treating children successfully according to the latest research in dentistry.

This paper will present a review of the international literature that provides scientific evidence (EBD) on the use of laser and its various possible applications in paediatric dentistry, and will attempt a discussion and a correct interpretation of the different results reported. A selection of clinical cases will document the clinical applications related to these scientific studies.

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Laser applications in paediatric dentistry

Laser in paediatric dentistry is an alternative instrument that sometimes complements, and other times substitutes, traditional techniques: various applications are possible on both soft and hard tissues using different laser wavelengths (Tables 1, 2; Fig. 1).

Leaving the discussion on the physical basis of laser therapy to other works and publications, it should however be remembered that different wavelengths do not have a similar interaction with the different chromophores (haemoglobin, water, hydroxyapatite) contained in the target tissue (mucosa, gingiva, dental tissue) and therefore the therapy is influenced by the different optical affinity and absorption coefficients of the tissues for each particular wavelength.

Soft tissue applications

Laser application in oral surgery

The use of laser for the removal of oral diseases and the therapy of lesions of the oral mucosa has specific applications in the field of paediatric dentistry.