Er:YAG Laser and desensitizing effects on dentine and neck of tooth

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_Aim

The aim of this clinical study is to compare the desensitizing effects on dentin and tooth neck of Dentin protector (Ivoclar Vivadent, Ellwangen, Germany), Duraphat (Colgate, Hamburg, Germany) and Er:YAG Laser(KEY III, KaVo, Biberach, Germany). In private dental offices the dentin hypersensitivity since years is a common cause of discomfort in patients. Around 7 % of the patients in the dental office of the author shows this problem. Reasons for dentin exposure are gingival recession following periodontal disease or periodontal therapy and trauma from tooth brushing (Schwarz 2002). A successfull reduction of hypersensitivity over long period was not reported at all in literature. Dentine hypersensitivity is a common painful condition about which relatively little is known. A review of the literature reveals that most research has been concerned with the clinical assessment of therapeutic agents (Addy 1992).

About the etiology of dentin hypersensitivities is not much known (Addy 1990). The most common therapy of hypersensitive dentin is using fluorid solutions (Gedalia et al.1978) or iontophoresis with fluorid paste (Jensen 1965, Johnson et al. 1982). Since beginning of the 90´s using of laser systems has shown good results. In literature two different methods using laser in hypersensitivities are desribed: the indirect application is a therapy with laser combined with tin—fluorid application and the direct application of laserlight (Bach 2007, Moritz 2006). In history there were a number of studies using Nd:YAG Laser (Gutknecht et al. 1997, Gelskey et al. 1993), CO_2 Laser (Moritz et al. 1996), GaAlAs Laser (Matsumoto et al. 1985, Gerschmann et al. 1994) and Er:YAG Laser (Schwarz et al. 2002) about this problem. All the studies couldn´t show positive long term results.

_Method

25 patients (11 females and 14 males, aged between 18 and 46 years, mean age 32 years) who shows a total of 172 contralateral pairs of hypersensitive and caries free teeth. There were no caries lesions on neighbouring or selected teeth, no desentizising therapy during the last 9 months and no cervical filling.

_Study design

Split mouth design. Teeth in the first quadrant were treated with Dentin Protector (Ivoclar Vivadent, Ellwangen, Germany), in the second quadrant with Er:YAG Laser (KEY III, KaVo, Biberach,

60 mJ, 2 Hz, Handpiece 2060 defocused, two minutes per tooth), in the third quadrant with Duraphat (Colgate, Hamburg, Germany) and the fourth quadrant served as an untreated control group. All patients were member of the oral hygiene programme and received the last professional tooth cleaning four weeks before treatment. The assessment of sensitivity was accorded by an pain scale in four degrees (Table 1). The neighbour teeth were shielded by casting material (Panasil, Kettenbach, Eschenbach, Germany). A three second cold air blast (18–20 °C) in distance of 2 mm was the qualitatively stimulation on the side to be tested. The other test sides received application from Dentin Protector or Duraphat according to the instructions by the manufacturer. Before treatment the teeth has been cleaned by floss and polishing.

Pain scale

Degree	Description
1	no discomfort during application of the stimulus
2	slight discomfort during application of the stimulus
3	mild discomfort or pain during application of the stimulus
4	severe discomfort or pain during and continuing for longer than five seconds after application of the stimulus

Table 1

Recording were assessed before treatment, immediately after, one week, one month, two months and six months after treatment by a blinded examiner.

_Results

No complications were observed. All treatment forms resulted in improvements of discomfort immediately and after one week. After one month examination the DP group increased up to56 % and the Duraphat group increased up to 57 %, the Laser group increased up to 42 % of the baseline score. After two month examination the DP group increased up to 64 %, the Duraphat group increased up to 68 % and the Laser group stayed nearly unchanged at 42 % of the baseline score.

After six month examination the DP group increased up to102 %, the Duraphat group increased up to 103 % and the Laser group slightly increased up to 55 % of the baseline score. The control group shows no improvement of discomfort all six months.

Mean degree of pain over 6 months (n = 25)

	before	after	1 week	1 month	2 months	6 months
Er:YAG Laser	3,52	1,36	1,48	1,52	1,52	1,96
DentinProtector	3,6	1,6	1,96	2,04	2,32	3,68
Duraphat	3,6	1,64	2,16	2,08	2,48	3,71
Control	3,6	3,56	3,52	3,36	3,52	3,68

Table 2

Compared to the control group all three treatment method showed reductions of discomfort all six month. The decrease of the positive effect with Er:YAG Laser has been shown after six months, the decrease of the positive effect of DentinProtector and Duraphat has been shown after two months. Desensitizing with Er:YAG Laser (KEY III, KaVo, Biberach, Germany) was effective. In comparison to the use of Duraphat (Colgate, Hamburg, Germany) and Dentin Protector (Ivoclar Vivadent, Ellwangen, Germany) the maintenance of the results was longer.

After six months there was a slightly increasing of discomfort in the Er:YAG laser group too. It seems that the Er:YAG laser is an suitable tool for treatment of dentine hypersensitivity. Further studies are needed over a long time period to evaluate long term stability of the positive results._

For literature, please contact the author.

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