A method for measuring the pulp chamber temperature during light curing

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INTRODUCTION: The study has as main purpose the description of a method for measuring the pulp chamber temperature during light curing.

METHODS: A class I cavity was prepared in an extracted mandible molar, leaving a dentin layer of 1 mm thick between the pulp chamber and the proximal cavity wall. The measurement of the temperature variations in the pulp chamber (starting with 37+/-0,1^{0}C) [1] was performed with a thermistor inserted in the pulp chamber during polymerization. Another thermistor was inserted in each filling to measure the variation of the temperature in the filling before, during and after the curing (Fig. 2). A 2 mm composite resin (the same in each sample) layer [2] was applied into the cavity and light cured. For the reproducibility process a mark was made on the tooth cavity walls in order to maintain the 2mm composite layer. No etching and bonding materials were used. Taking the filling out was done by high speed drilling in permanent cooling and sharp instruments for leaving a 1 mm thick dentin layer between the pulp chamber and the bottom of the cavity. The curing used units were: halogen unit (Degulux, Degussa), LED (Bluphase C5, Vivadent and MiniLed, DeTrey Dentsply) and plasma unit (Apollo 95E, DMDS). Light curing took place for 20 seconds for halogen and LED units and 6 seconds for plasma unit.

RESULTS: The results of this study are the mediated values of temperature variation recorded in the pulp chamber and in the composite filling during and after curing, untill these variations tend to disappear. The maximum mediated temperature value variation was recorded with the halogen unit (4,2 ^{0}C), higher than for the LED curing (3,0^{0}C), and with plasma unit (1,2^{0}C).

Fig.1. The measurement stand used in this study to measure the pulp chamber temperature.

The main observation is related to the temperature variation values.

The mediated values obtained from the thermistor, one inserted in fillings and the other one inserted in pulp chamber, show that the temperature is also raising in both locations, after the curing light unit was stopped.

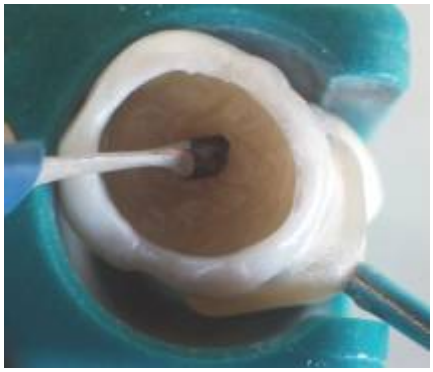

Fig. 2. The thermistor inserted in the filling to measure the variation of the temperature in the composite filling.

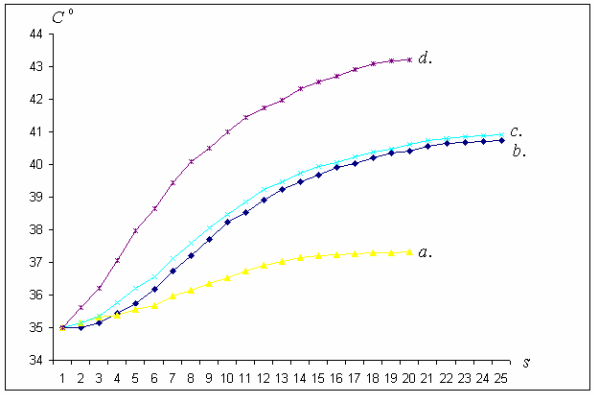

Fig. 3. The temperature variation in the composite filling during and after the curing.

DISCUSSION & CONCLUSIONS: The pulp chamber temperature varies with the type of the light unit used (maximum for halogen curing unit, moderate for LED and minimum for the plasma curing unit) and proportionally with the caloric capacity of the composite material used for filling. Further investigations should be focused in this direction.

REFERENCES: [1] A. Lindberg, A. Peutzfeldt, van J.W. Dijken (2005) *Clin Oral Investig* **9:**71–6.

[2]A. Peutzfeldt, E. Asmussen (2005) *J Dent Res* **84**:659–62.