Cooling Profile Following Prosthetic Preparation of 1-Piece Dental Implants

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The aim of this study was to evaluate the effect of water irrigation on heat dissipation kinetics following abutment preparation of 1-piece dental implants. UNO 1-piece dental implants were mounted on Plexiglas apparatus clamping the implant at the collar. T-type thermocouple was attached to the first thread of the implant and recorded thermal changes at 100 milliseconds intervals. Implants were prepared using highspeed dental turbine at 400,000 RPM with a coarse diamond bur. Once temperature reached 47°C, abutment preparation was discontinued.

Thirty implants were divided into 2 groups. Group A: Passive cooling without water irrigation. Group B: Cooling with turbine’s water spray adjacent to the implant (30 mL/min). The following parameters were measured: T47 (time from peak temperature to 47°C), T50%, T75% (time until the temperature amplitude decayed by 50% and 75%, respectively), dTemp50%/dt decay, and dTemp75%/dt decay (cooling rate measured at 50% and 75% of amplitude decay, respectively). Water spray irrigation significantly reduced T47 (1.37 ± 0.29 seconds vs 19.97 ± 3.06 seconds, P < 0.0001), T50% (3.04 ± 0.34 seconds vs 27.37 ± 2.56 seconds, P < 0.0001), and T75% (5.71 ± 0.57 seconds vs 57.61 ± 5.47 seconds, P < 0.0001). Water spray irrigation also increased cooling capacity ninefold: dTemp50%/dt decay (4.14 ± 0.61°C/s vs 0.48 ± 0.06°C/s, P < 0.0001), and dTemp50%/dt decay (1.70 ± 0.29°C/s vs 0.19 ± 0.03°C/s, P < 0.0001). The continuous use of water spray adjacent to the abutment following the cessation of implant preparation might prove beneficial for rapid cooling of the implant.

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ABSTRACT.

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