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Thermal Burn Caused by a Laryngoscope

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Accidental thermal burns during general anesthesia have been caused by such problems as poor grounding of cautery, grounding leakage and fault currents through spurious electrical pathways, and improperly functioning warming and cooling blankets. This report presents an unusual case of second to third degree burns of the skin caused by a laryngoscope. Further studies were undertaken to determine the thermodynamic property of the laryngoscope used.

REPORT OF A CASE

A healthy five-month-old boy, 7.2 kg, was scheduled for the correction of club feet. The only premedication was atropine, 0.15 mg, im. Following inhalation of nitrous oxide and halothane, an intravenous catheter was inserted in the right hand. Intubation of the trachea was performed using a #3 endotracheal tube after the intravenous administration of succinylcholine, 8.0 mg. The laryngoscope was then placed on the operating table to the left side of the baby. During the next few minutes, the anesthetist checked the position of the tube and taped it in place. Approximately 5 min after endotracheal intubation, the laryngoscope, with the light still on, was noted to be leaning against the flank of the patient; a second or possibly third degree burn of

the skin resulted at the site of contact with the bulb. The burn was subsequently treated with occlusive dressings and eventually healed with a 1.5 × 1.2 cm scar.

METHOD

Several tests were performed on that particular laryngoscope to verify that enough heat can be generated to produce a burn. Three other bulbs and blades of similar size were tested and compared. The following tests were performed.

Electrical properties of the bulbs and blades. Voltages of fresh batteries were measured to insure an initial operating voltage of 3.0 volts. Amperage drawn by each bulb was measured and recorded once it had reached a constant value.

Temperature of the bulb. By standardizing all light sources (3.0-volt direct current, identical to that produced by two 1.5-volt, AA size batteries), three laryngoscope blades, a Foregger Miller-1, a Foregger Flagg-1, and Harris-Lake Miller-1 were tested. An electronic thermister (Yellow Spring Model 42 SC) and a telethermister (3 mm surface contact diameter) were used to measure changes in the temperature of the bulb. The thermister was placed just below the light bulb.

Normal saline jacket test. A 3.0-mm internal diameter polyethylene tube, 3 cm in length, was tightly fitted to each bulb and the jacket above the bulb was filled with 0.1 ml of normal saline. The temperature changes were monitored by a bead thermister immersed in the saline.

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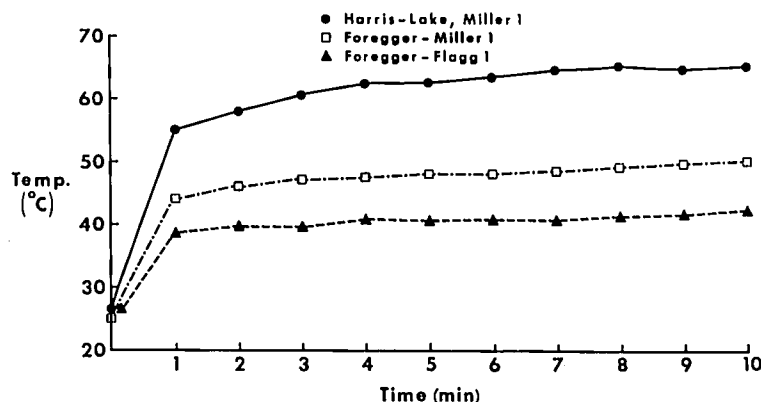
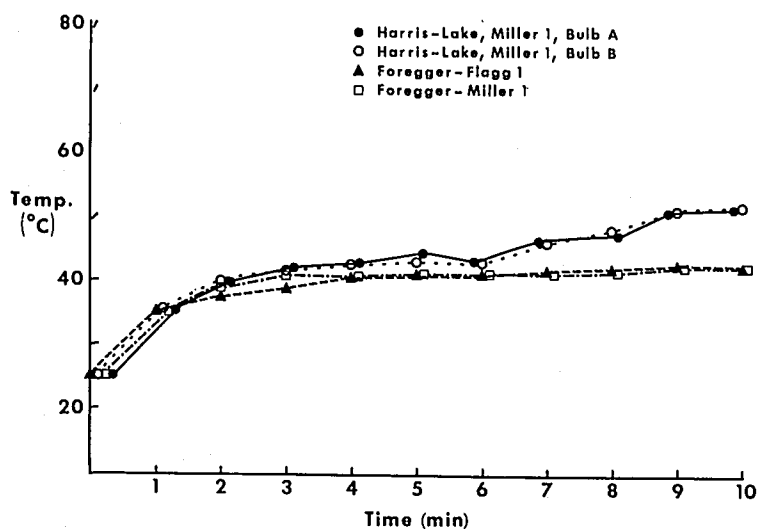


FIG. 1. Comparison of temperature elevation by three different laryngoscopes as measured by direct contact of thermister to the light bulb.

FIG. 2. Temperature elevation of the normal saline bath by four different laryngoscopes.



RESULTS

Electrical properties. No abnormality was found on the bulbs and blades beyond their specifications. At the operating voltage of 3.0 volt, the bulb that caused the burn to the patient, drew 307 milliamperes of current and dissipated 0.921 watts. The three other new bulbs drew 305, 304, 306 milliamperes, respectively.

Temperature of the bulb. After ten minutes of continuous exposure, the temperature rose to 65° C in the Harris-Lake Miller-1, to 50° C in the Foregger Miller-1, and 42° C in Foregger-Flagg-1 (fig. 1).

Normal saline jacket test. The saline temperature of the Harris-Lake Miller-1 had increased to 51° C in the original bulb that had burned the patient, and 52° C when another new similar bulb was used. With Foregger Miller-1 and Foregger Flagg-1, the saline temperature increased to 43° C and 42° C, respectively (fig. 2).

DISCUSSION

During general anesthesia the patient becomes vulnerable to bodily injury apart from the surgical

procedure. In the case presented, the burn was caused by a laryngoscope. The injury occurred during the induction of anesthesia and was discovered before the surgery began. Therefore, the possibility of the burn being caused by a defective cautery did not arise.

Our studies revealed the Harris-Lake Miller-1 laryngoscope blade produced a significantly higher temperature than two other models tested. The Harris-Lake Miller-1 has the widest space between the bulb and the blade.

Whether these differences in the design significantly alter the thermal dissipation properties of these laryngoscope blades is difficult to ascertain. However, if heat dissipation is constrained, the bulb temperatures of all the blades are probably sufficient to produce a cutaneous burn with prolonged contact.

In summary, a second or possibly third degree burn which was caused by a laryngoscope bulb occurred in an infant. Undoubtedly most anesthesiologists turn off their laryngoscope blades immediately after use. This complication serves to emphasize that if the laryngoscope blade is not turned off, and if it is placed in contact with the patient, a burn may result.