

Headlight with fiber-optic xenon light source may cause harm to patients

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Received 29 April 2008

1. Introduction

Burns in patients undergoing surgery and general anesthesia have been reported to occur from different reasons such as electrosurgical and electrocautery units, electrocardiogram, laser, and skin preparation agents [1,2]. Recently, light sources have caused fires in the operating rooms especially if allowed to contact the modern paper drapes (personal experience). Newer and higher intensity surgical headlamps have the potential for causing both fires and burns. We present a case report to (1) show the potential for damage to patients if these units are not used correctly, (2) encourage physicians to learn the proper and safe use of these newer fiber-optic light source units, and (3) emphasize to surgeons and anesthesiologists the potential of patient damage from fires in the operating room.

2. Presentation

A burn on the neck was noticed on a child at the end of the procedure. The child underwent neck surgery with general anesthesia. The burn was diagnosed as first and second degree just around the incision where surgical drapes were not covering the child's skin (Figs. 1 and 2). The area was the site of the surgery where the light source was beaming on. The BFW, model 3010, Maxenon (QED, Lexington, KY) headlight with fiber-optic xenon light source was taken out of service immediately and sent to a nonbiased third party for full testing and evaluation.

3. Results of evaluation

Results from the nonbiased third party evaluation showed that the electrical safety was in accordance with all applicable state and national codes and regulations. No mechanical or functional problems were found. However, an aspect of the machine operation was found that could be responsible for the patient burn incident. Using a digital infrared thermometer, temperature radiation with lens aperture fully opened and fully closed at distances were tested (Table 1). Based on thermal data, open apertures (ie, maximum light intensity) with the lens at 15.2 cm and 30.5 cm away from skin had the potential to produce burns with temperatures greater than 73.7°C; small aperture settings (ie, lower light intensity) had little or no potential for causing skin damage at any distance from the lens with temperatures less than 28.3°C. For exposure times greater than 30 seconds, at 15.2 cm, and



Fig. 1. Skin burns on the neck.

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Fig. 2. Skin burns on the neck.

open aperture, the heat from the light becomes uncomfortable (personal experience).

4. Discussion

The ECRI Institute's Medical Device Safety Reports database publishes an extent report about investigating device-related "burns" [3]. Skin burns in the operating room are due to different causes. Common causes of skin burns include (1) electrical (radio frequency—electrosurgery; magnetic resonance imaging radio frequency coils; direct current—batteries, circuit continuity monitors, pacemakers, nerve and muscle stimulators; and alternating current—60-Hz line voltage), (2) thermal (direct contact—heating pads, electrocautery, diathermy, heated irrigation solution bag, excessively heated cotton blanket, unlubricated surgical drill shank; irradiant—radiant warmers, examination and operating lights, fiber-optic light cables, lasers; and exothermic chemical reaction—merthiolate on aluminum electrode), (3) chemical (povidone-iodine preparation solutions, ethylene

Table 1
Light intensities vs distances and aperture

| Distance (cm) | Aperture closed, small beam (temperature, °C) | Aperture open, maximum beam (temperature, °C) |
|---------------|---|---|
| 15.2 | 25.3 | 73.7 |
| 30.5 | 28.8 | 49.2 |
| 45.7 | 28.3 | 38.7 |

oxide, improper electrode plating), and (4) mechanical (tenacious electrode adhesive). Light source have been reported as a cause for retinal damage but not skin fire [4]. We present information showing that the use of the BFW, model 3010, Maxenon (QED, Lexington, KY) headlight with fiber-optic xenon light source may have a potential for being mishandled.

We encourage physicians who use the BFW, model 3010, Maxenon (QED, Lexington, KY) headlight with fiber-optic xenon light source to become familiar with the manufacturer's recommendations and user's manual and to attend the company's in-service training demonstration. Since reporting our case to the company, BFW has updated the user manual by recommending a safe distance of 40.6 cm.

In summary, The BFW, model 3010, Maxenon (QED, Lexington, KY) headlight with fiber-optic xenon light source has a potential for patient damage if used incorrectly, and we encourage physicians to learn the proper and safe use of these newer fiber-optic light source units.

References

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