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Patient Safety Tip of the Week

April 25, 2023

Joint Commission: Beware Light Source Burns

In our many columns on iatrogenic burns and surgical fires, we have only briefly mentioned fiber optic cables as a heat source. Now Joint Commission has published a Quick Safety issue on the dangers of fiber optic cables in producing burns in laparoscopic or arthroscopic surgery (TJC 2023). Fiber optic cables are used in the light sources for the scopes used in these procedures. More than half of the fires/burns sentinel events reported to The Joint Commission since 2019 were associated with surgical or invasive procedures, and nearly 15% of those peri-procedural incidents were related to light sources.

The Joint Commission emphasizes that burns from these types of light sources can go unnoticed by the surgical team because they typically do not produce smoke or charring, even of surgical drapes.

Either of the two major components to the illumination system, the light source and the light cable, are capable of producing heat. The **light sources** themselves has safety mechanisms to minimize the heat generated (heat filters and light source fans). Laparoscopic light **cables** are available as fiberoptic or gel-filled. Gel-filled cables are capable of transmitting 30% more light, but also more heat, and therefore they can be potentially more hazardous.

Excess heat can occur if any of the heat minimizing devices fail within the light source or if the light source or light cable is defective. Also, use of different connectors or components may result in excess heat.

Detached light cables resting against surgical drapes may also lead to burns. This can happen without knowledge by the surgical team because of the lack of smoke or fire. The patient, who is under anesthesia, cannot feel pain so the exposure to the heat source may continue for some time (remember: thermal injuries are a function of both temperature and duration of exposure). We've seen similar injuries when a flash sterilized retractor that was too hot for the surgeon to handle was placed on the drapes over a patient. In

such cases there may be no evidence of burn on the drapes but burn of the patient's skin (and even deeper levels) may be extensive. In one case report (Chitnavis 2020), a full-thickness 1-cm burn occurred on a patient's thigh related to the fiber optic cables that had been rested on a paper drape overlying the patient's thigh. Examination of the drape revealed only a pinhole-sized perforation with localized brown staining on the part that had covered the thigh.

The risk of thermal injury rises with the brightness of the lamp used. But, as above, the duration of exposure is equally important.

In our September 5, 2017 Patient Safety Tip of the Week "Another Iatrogenic Burn" we noted that delayed complications may arise from thermal injuries related to electrocautery devices during surgery. Such are well known to structures such as bowel and ureters. Such injuries are often not recognized and result in tissue necrosis and delayed manifestations of symptoms. It is certainly conceivable that a thermal injury from light sources or cables could be capable of the same.

Joint Commission recommends organizations take the following actions to help prevent burns related to the use of these scopes:

- Educate all surgeons, including physicians-in-training, who perform laparoscopic or arthroscopic procedures on the importance of handling the scope safely.
- Implement system changes to minimize the risk of patient burns associated with laparoscopy and arthroscopy.
- Label light sources with the following: "Warning: High-intensity light sources and cables can ignite drapes and other materials. Complete all cable connections before activating the light source."
- Do not turn on the light source before the cable is connected to the scope; the end of the cable becomes hot and could ignite dry combustibles.
- If the cable is disconnected from the scope during surgery, hold the cable end away from the drapes or place it on a moist towel.
- Keep illuminated light cords away from drapes, patient's skin, personnel's skin, and any flammable material.
- Connect the correct size light source to the correct scope.
- Inspect all instruments and equipment before use to ensure the equipment is in good working order.

Many of those recommendations come from an article on a thermal injury related to the distal tip of the laparoscope had been placed on drapes over a patient's thigh (Ball 2004).

Perhaps the other lesson here is that we probably should not be using the drapes overlying a patient for temporary placement of any items. If we are in the habit of placing instruments there, it is not surprising that we might place a potential heat source there as well. It probably makes more sense to hand such items to the scrub nurse or surgical tech to place on the instrument tray.

Other light sources linked to iatrogenic burns have included ultraviolet light therapy, the operating microscope, and even overhead halogen lamps in the OR.

Don't forget light sources as potential ignition sources in surgical fires. The 2008 ASA Practice Advisory for the Prevention and Management of Operating Room Fires (ASA 2008) also mentions fiberoptic light cables as potential heat sources in surgical fires.

Our prior columns on iatrogenic burns:

- March 2009 "Risk of Burns during MRI Scans from Transdermal Drug Patches"
- June 1, 2010 "Iatrogenic Burns"
- October 5, 2010 "More Iatrogenic Burns"
- December 23, 2014 "Iatrogenic Burns in the News Again"
- March 2015 "Another Source of Iatrogenic Burns"
- September 5, 2017 "Another Iatrogenic Burn"
- June 5, 2018 "Pennsylvania Patient Safety Authority on Iatrogenic Burns"
- July 28, 2020 "Electrosurgical Safety"
- January 2021 "New MRI Risk: Face Masks"
- May 3, 2022 "Iatrogenic Burns Again"
- December 6, 2022 "Rare Risk – Defibrillator Fires"

Our prior columns on surgical fires:

- December 4, 2007 "Surgical Fires"
- April 29, 2008 "ASA Practice Advisory on Operating Room Fires"
- November 2009 "ECRI: Update to Surgical Fire Prevention"
- January 2011 "Surgical Fires Not Just in High-Risk Cases"
- March 2011 "APSF Fire Safety Video"
- November 2011 "FDA Initiative on Preventing Surgical Fires"
- December 13, 2011 "Surgical Fires Again"
- April 24, 2012 "Fire Hazard of Skin Preps Oxygen"
- April 2013 "Reminder: Hand Sanitizers Are Flammable"
- June 25, 2013 "Update on Surgical Fires"
- October 1, 2013 "Fuels and Oxygen in OR Fires"
- August 12, 2014 "Surgical Fires Back in the News"
- December 16, 2014 "More on Each Element of the Surgical Fire Triad"
- December 2015 "Unique Ignition Sources in Surgical/OR Fires"
- January 10, 2017 "The 26-ml Applicator Strikes Again!"
- January 9, 2018 "More on Fire Risk from Surgical Preps"
- June 2018 "ISMP on Fire Risk from Skin Preps"
- July 2018 "FDA on Surgical Fires"
- September 11, 2018 "Lessons from a Surgical Fire"
- May 7, 2019 "Simulation Training for OR Fires"

- July 2019 "Surgical Fire – A New Risk Factor"
- July 28, 2020 "Electrosurgical Safety"
- July 2021 "Unique Way to Rapidly Identify Oxygen Flow"
- November 30, 2021 "Fire in the OR"
- December 6, 2022 "Rare Risk – Defibrillator Fires"

References:

The Joint Commission. Quick Safety Issue 69: Preventing light source-related burns from laparoscopy and arthroscopy. The Joint Commission 2023; April 10, 2023 https://www.jointcommission.org/resources/news-and-multimedia/newsletters/newsletters/quick-safety/quick-safety-issue-69/#.ZDgbpfbMJEY

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Chitnavis J. Silent burn: The hidden danger and effects of bright light from fibre-optic cables in arthroscopic knee surgery. Journal of Surgical Case Reports 2020; 2020(4) https://academic.oup.com/jscr/article/2020/4/rjaa068/5816682

ASA (American Society of Anesthesiologists). American Society of Anesthesiologists Task Force on Operating Room Fires. Practice advisory for the prevention and management of operating room fires. Anesthesiology 2008; (108): 786-801 https://pubs.asahq.org/anesthesiology/article/108/5/786/8376/Practice-Advisory-for-the-Prevention-and

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