E49 Surgical Fire: A Case Report, Literature Analysis, and Medicolegal Considerations

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Learning Overview: After attending this presentation, attendees will understand the principles of a Surgical Fire (SF), its origin, its development, its consequences, and how to prevent it.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by serving as a key aspect of medicolegal implications of SF, analyzing each phase of the event before (propriety of informed consent), during (recommendations of best practices, protocols, and medical liability), and after (entity of lesions, necessity of reactive root cause analysis) the ignition.

SF is defined as fire that occurs in, on, or around a patient undergoing a medical or surgical procedure and is considered a "sentinel event." Other sentinel events include wrong-site surgery and retained surgical items. These are "never events," due to potentially serious or fatal consequences.[1] While data and reports published in Italy and Europe are lacking, in the United States, the prevalence of SFs has been estimated at approximately 600 events per year, and the total number of events is probably underestimated. The "fire triangle" theory is utilized for explaining the fire's origin. Fire is composed essentially of three elements that are always present in the Operating Room (OR): (1) ignition—represented by electrosurgical units, lasers, defibrillators, etc.; (2) oxidizer—oxygen, nitrous oxide, medical compressed air, ambient air, etc.; and (3) fuel—alcohol skin preps, drapes/gowns, gauze/sponges, patient's hair/skin, Endotracheal Tube (ETT)/nasal cannula, intestinal gases, etc. These devices and components are commonly used in the modern OR, and the complete elimination of fire risk is impossible. The American Scientific Society has provided recommendations of best practices to reduce the risk of SF.[2]

The reported case regards a 65-old woman with suspected thyroid carcinoma recovered in the University Hospital of Messina (Sicily, Italy). The patient was undergoing Video-Assisted Thyroidectomy (VAT) and suffered an SF during the wound closing surgical phase, which involved surgical drapes of the perioperative field. The surgical procedure was under general anesthesia (with ETT and 30% 2/L min 02 supply). The fire was most likely produced by the ignition of the applied alcohol-based disinfectant (chlorhexidine gluconate) by monopolar electrocautery. Although the fire was promptly extinguished by the OR team, the patient reported disfiguring second- and third-degree burns to the antero-lateral surface of the neck.

An analysis of this case and a literature review suggest the following medical-legal considerations: informed consent must include the risk of this potentially high-grade surgical complication; and establish an Italian national best practice and intra-hospital protocol to calculate the fire risk score during surgery and develop a strategy for effective communication between the OR team (particular attention should be paid to the head/neck and pelvic regions, which are the most frequent regions that involve SF); finally, a reactive root cause analysis of each SF case should be done to collect data to identify health care improvement strategies. Current international best practices/strategies, designed to establish medical malpractice, include a delay of less than three minutes between application of an alcohol-based disinfectant and activation of electrocautery.

Reference(s):

1. Hempel S. et al. Wrong-site surgery, retained surgical items, and surgical fires: A systematic review of surgical never events. *JAMA Surg*. 2015; 150(8):796–805.
2. Kezze I., Zoremba N., Rossaint R., et al. Risks and prevention of surgical fires: A systematic review. *Anaesthesist*. 2018;67:426.

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