

Surgical site fire: a case of evil spirit or lapsed communication?

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ABSTRACT

Electrocautery has become an indispensable tool in the operating room mainly to achieve bloodless surgical field. However, it does carry several risks including fire burn. Abundant fuels and oxidizer in operation theatre in the presence of electrocautery can easily get ignited, imposing serious risk to the patient and health professionals. This report of a case of surgical site burn injury due to unintentional reuse of a spirit soaked gauze piece intends to create awareness among health professionals and staff regarding such serious complication.

Keywords: Burn injury, electrocautery fire, infallible communication, operation theatre, spirit.

INTRODUCTION

Electrocautery has become a routine surgical tool for cutting or coagulating tissue and achieving bloodless surgical field. The ease of using electrocautery might have already made many surgeons forget other modalities of hemostasis. Despite its easy use and effectiveness, it is not without risks. Infact, it can produce serious consequences such as electric shock, explosions, arrhythmias, disturbances in pacemaker functioning and burns.¹

Presence of inflammable fuels including alcohol based preparation solution and oxidizer further increases the possibility of operation room fire with the use of electrocautery, imposing a serious risk both to the patient and care givers.

Though, the true incidence is unknown, it has been estimated that 550-650 operating room fires occur in the United States alone each year, with 20 to 30 of these events deemed serious and 1 or 2 directly resulting in death.² Nearly 70% of these fires are related to the use of electrosurgical equipment and in 75% of cases, an oxygen-enriched atmosphere has been shown to have contributed to the fire. It has also been noticed that there is a significant risk of fire when alcohol based solutions are used for skin preparation.²

Despite high risk in the operation room, the incidence of surgical fire is underreported because of concerns for liability issues³ and lack of proper reporting mechanisms.

Here we report a case of an 8-year-old child who sustained surgical site burn injury due to an unintentional reuse of a spirit soaked gauze piece while electrocautery was functional.

CASE REPORT

An 8-year-old female child was undergoing right modified radical mastoidectomy for chronic suppurative otitis media. On the operating table, anaesthesia was induced and her trachea was intubated. The right posterior auricular area was cleaned twice with povidone iodine followed by spirit by the surgeon's assistant. After complete drying of the antiseptic solution, sterile drapes were applied and the skin was incised by the surgeon with a knife. Electrocautery was then brought in to the surgical field for deeper dissection. Immediately after activation of electrocautery, flames were noticed around the surgical site spreading to the occipital area and burning the surrounding hair. Electrocautery was switched off immediately, fire was extinguished using a cotton towel and the drapes were removed. The fire resulted in a first degree burn at the surgical site involving the ear lobule and was of approximately 1% of total body surface area (Fig-1).

The electrocautery was checked and found to be intact and properly functioning. On careful examination, it was found that the flames occurred due to reapplication of spirit by gauze piece that was used initially to wipe out the excess of spirit at the time of skin preparation. The spirit soaked gauze piece was left unintentionally near by the surgical site and was forgotten to be disposed immediately. Incidentally, the same gauze piece was used for wiping blood after skin incision resulting in reapplication of spirit at the surgical site and ignition of fire.

Once settled, the drapes were reapplied and the surgery was completed. The intraoperative and postoperative period was uneventful thereafter. The burn injury healed with no complication and the patient was discharged on the eighth postoperative day.



Fig. 1. Photograph shows the burn injury involving the post-auricular area, ear lobule and the surrounding hair.

DISCUSSION

Fuel, oxidizer and ignition source are the three elements of a Fire Triad⁴ which are abundantly present in an operation theatre. Fire is prevented by not allowing all 3 of the elements to come together at the same time⁵ and has been recommended that removal of the fuel is the most reasonable and efficacious approach.⁶

Unlike most reports of surgical fire, where supplemental oxygen has been described as an oxidizer,⁷ room air was an oxidizer in our case. Electrocautery acted as the heat source in our patient as in the majority of cases. Burn injury due to electrocautery has been divided in to 4 categories.⁸ (1) direct contact burns resulting from inappropriate operator use of the active electrode, (2) burns at the grounding electrode site due to improper attachment or placement, (3) burns resulting from electrode heating of pooled solutions, and (4) burns occurring outside the operative field as a result of circuits generated between the active electrode and an alternate grounding source. The burn in our case was of the third category.

Reports on operation room fire due to use of an alcohol based antiseptic are limited. Most of these mention incomplete drying of the antiseptic solution because of either soaking of the solution in the hair and linens or pooling of the solutions in the body cavities.^{6,9} Undoubtedly, alcohol antiseptic acted as a fuel in our case but the reason for ignition was unintentional reuse of spirit soaked gauze piece. The person involved in skin preparation after wiping excess of spirit, forgot to dispose the gauze piece and left it on the trolley. He failed to communicate this to the team members as he had to leave the operation room immediately for some reason. The

use of same gauze piece for blotting blood after skin incision resulted in the reapplication of spirit and ignition of fire in our case. Surgical mask and gloves used during operative procedure undoubtedly prevented the appreciation of the odor and temperature of the spirit. The light color of the spirit that is soaked in the gauze piece is likely to be missed preventing its recognition.

Because of strict recommendation to use alcohol based substances for hand hygiene and skin antiseptic,¹⁰ these solutions cannot be completely withdrawn from the routine surgical practices. However, its use can be limited. Simply taking few precautions like application of the solution like a paint rather than the drippy and runny coating, allowing adequate time for drying up of the solution

and making a conscious effort to discard all the soaked sponges and gauze pieces will perhaps decrease the incidence of alcohol induced fire in the operation theatre. Moreover, adhering to team approach in real sense in patient care,² can effectively minimize and prevent surgical fire and its consequences.

It can be concluded that vigilance and infallible communication among the members in a working team are of vital importance in preventing and minimizing catastrophic events like surgical fire as highlighted by this particular case.

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