

Iatrogenic Burns

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Abstract

Iatrogenic burns are rare complications that can occur after using medical devices and chemicals in hospitals. Usually, these burns are deep and cause additional morbidity to patients. In this article, 6 iatrogenic burn patients referred to our department are presented, and predisposing factors and preventive measures are discussed.

Keywords: Iatrogenic burn, electrosurgery, skin graft

INTRODUCTION

A broad plurality of medical devices and types of medicine are used in hospitals to treat patients whether for surgical procedures or for providing patient comfort. Although they are of benefit, these devices also carry some risks depending on their properties or modes of application. Although some of these risks, such as minor tissue damages, can be quickly remedied, some can result in serious morbidities and even fatalities. Therefore, regular training is given in hospitals to the healthcare staff on how to use these devices, and periodic checks are conducted during application. However, irrespective of the meticulous use, some irreversible issues can arise in practice. One of the complications caused by erroneous or careless employment of medical devices and techniques is burns, particularly iatrogenic burns.¹⁻³ Iatrogenic burns generally occur as deep burns and require surgical treatments or procedures.

CASE PRESENTATION

In the past 2 years, six iatrogenic burn cases that occurred as a result of medical application were referred to our department for consultation by other departments in our hospital. Written consent was obtained from the patients for the study. Findings related to the patients are summarized in Table 1.

A 65-year-old female patient with endometrial carcinoma was operated on in the gynecology and obstetrics department. The patient's blood pressure could not be regulated during the operation, and the anesthesiology team suggested applying hot compression on the wrists. Subsequent to the application, approximately 10×5 cm necrotic third-degree burns occurred on the volar surface of the right wrist, and 4×4 cm necrotic third-degree burns occurred on the volar surface of the left wrist (Figure 1). The patient was referred to our department where the wrists were reconstructed with necrotic tissue debridement and partial skin grafting. No complications occurred during postoperative follow-up, and the patient was discharged.

A 52-year-old female patient applied to the cardiology department with a complaint of palpitation. Subsequent to the examination, the patient was diagnosed with cardiac dysrhythmia and radiofrequency ablation was planned. Erroneous orientation of the electric current in the procedure resulted in a 5×4 cm necrotic third-degree electric burn in the left infrascapular region. The patient's burn site was debrided in our clinic and reconstructed with a partial thickness skin graft. No complications occurred during postoperative follow-up, and the patient was discharged.

Table I. Summary of cases

	Age	Consulting clinic	Burn site	Burn degree	Etiology
Case 1	65	Gynecology and Obstetrics	Both wrists	3	Hot application
Case 2	52	Cardiology	Left subscapular region	3	Electrosurgery
Case 3	60	Cardiovascular Surgery	Anterior thoracic wall	3	Electrosurgery
Case 4	74	Urology	Both feet	3	Hot application
Case 5	5.5	Pediatric surgery	Sacrum	2	Electrosurgery
Case 6	65	General Surgery	Left breast	3	Flaring of antiseptic solution



Figure 1. a, b. View of Case 1 at presentation to our clinic: Left wrist (a), right wrist (b)



Figure 2. View of the case at presentation for consultation from the Cardiovascular Surgery clinic

A 60-year-old male patient diagnosed with atherosclerotic heart disease was planned for coronary bypass surgery. Contact of the electrocautery pen with the healthy skin tissue during the procedure resulted in a 6×4 cm necrotic third-degree electric burn along the upper incision line (Figure 2). The necrotic site was reconstructed in our clinic with debridement and partial skin grafting. No complications occurred during postoperative follow-up, and the patient was discharged.

A 74-year-old male patient was planned to undergo surgery for prostatic hyperplasia. Application of hot water bags to the front of both legs during the procedure resulted in a 12×10 cm necrotic third-degree burn on each leg. The necrotic sites were reconstructed in our clinic with debridement and partial skin grafting. No complications occurred during postoperative follow-up, and the patient was discharged.

A 5.5-year-old female patient underwent a surgery for Wilms' tumor. Misapplication of the cauterization plate resulted in a second-degree burn in the sacral region (Figure 3). Because the patient needed to undergo chemotherapy and radiotherapy, an operation could not be planned; the patient was treated with wound dressing during this period, and the wound was healed by secondary closure.

A 65-year-old female patient was planned for biopsy after a mass was detected in her left breast. In the biopsy, electrocautery was applied before the antiseptic on the breast had completely dried, causing ignition and resulting in a third-degree burn across the whole left breast. The necrotic site was reconstructed in our clinic with debridement and partial skin



Figure 3. Second-degree burn in the sacral region caused by the misapplication of the rotating electrode of the unipolar cauterization plate

grafting. No complications occurred during postoperative follow-up, and the patient was discharged.

DISCUSSION

Iatrogenic burn incidents in the hospitals are rare and generally non-life-threatening complications that are not reported. These types of burns mostly occur as a result of cautery plate problems during the use of electrocautery. Electrosurgical devices are the most fundamental equipment used in the operating room (OR) and small surgical procedure room. Electrocautery devices are used for burning tissues using electric current by means of a conductor. The heat generated by the device impacts eruption of the cells to provide incision or contraction of the cells to provide coagulation, i.e., hemostasis. There are two types of electrocautery, namely "unipolar" (or "monopolar") and "bipolar," that are employed depending on the purpose and the mechanism. Both types of devices comprise two electrodes, one active electrode for electric flow and one return electrode attached to the patient. In unipolar modality, the active electrode is used on the operation site, and the return electrode is placed on the patient as appropriate. Cautery is used for radiofrequency ablation in the treatment of cardiac dysrhythmia function in the same way as the unipolar cautery and pose burn risks if not applied properly.⁴ The bipolar cautery device, on the other hand, comprises two probes that function as the active and return electrodes, thereby eliminating the need to place a return electrode on the patient's body. If the surface area between the patient and the return electrode is small, then the current is concentrated on a smaller area. The generated heat increases with the intensity of the current flow, and burns occur if the heat exceeds a certain temperature. It is known that the major cause of cautery-related burns is wrong implementation, of which the most frequent is poor placement of the return electrode (the cautery plate) on the patient's body.^{5,6} The patient should be examined for any metal implants, and any jewelry should be removed. The plates to be used must be

of suitable size for the surface area and must fully contact the patient's skin surface. The plate must be placed close to the surgery site, on a smooth, hairless, clean, dry, and well-vascularized muscle. The plate must be properly placed on the patient before the surgery and should be regularly checked in long-lasting procedures, and measures such as cold compression should be taken in case of temperature increase. Cut and burn settings of the cautery are of further importance. Cauterization applied with setting at a high mode can quickly expose the Therefore, the cut and burn settings of the cautery device should be verified prior to the procedure by both the surgeon and the OR team.

Two of our cases are seen to have incurred burns as a result of the hot application procedure while under general anesthesia or spinal anesthesia. Hot applications for any reason under anesthesia require great care. The temperature of the tools used for hot application should be verified, and the application site should be checked.^{7,8}

If antiseptics that contain flammable ingredients such as alcohol are used, the area on which the antiseptic is applied should be allowed to dry completely.⁹ Chlorhexidine and povidone iodine, used as antiseptics, are known to possibly cause chemical burns on some regions of the body because of long exposure.^{10,11}

Iatrogenic burns are generally deep burns and require additional surgical procedures. Complications caused by mistakes, next to the reasons why patients have initially applied to the hospital, lead to extended stays and increased morbidity risks. This outcome, in turn, also gives rise to higher healthcare expenses and hence economic loss. Such adverse outcomes should be given consideration, and any possible measures should be determined in detail. Necessary information should be given to the healthcare staff about the installation and connections of the equipment, proper placement of the cautery plate, monitoring of the plate during the procedure, aspects that need the attention of the user, cleaning of the tools after the procedure, discarding disposable items, regular maintenance of the equipment, issues to consider when applying hot treatments, and the properties and risks of the antiseptics used in the hospital, and these aspects should be monitored.

CONCLUSION

Iatrogenic burn is a rare complication that can occur as a result of the procedures applied by means of tools in hospitals for therapeutic purposes. Its causal factors are neither as abundant nor as varied. Use of cautery devices, hot applications, and antiseptics constitute the major causes. As a matter of fact, most of the time, this type of a burn is not caused by the medical device or the material that is being used but by the healthcare staff who use them improperly and carelessly. Although burns that necessitate surgical procedures on smaller parts of the patient's body are frequently encountered, cases that lead to a fire in the OR, jeopardizing the lives of both the patient and the healthcare team, are also

seen. Being rarely encountered, these complications are not issues that the healthcare staff always bear in mind; however, a kind a complication that should be inarguably provisioned against and attended to since it can be life threatening. On this account, importance should be placed on training and supervision to adopt advancing technologies and to prevent mistakes caused by the staff.

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