

CASE REPORT **BURNS**

Thermal burns post abdominal surgery: a case report

Sinem Gultekin BBiomedSci (Hons), MD  0000-0002-6096-8027,^{1,a} George Miller BMedSci, MBBS (Hons), FRACS (Plast)  0000-0001-8482-4100¹

¹ Victorian Adult Burns Service, Alfred Health, Melbourne, Victoria, AUSTRALIA.

Keywords: abdominoplasty, burns, postoperative complications

Submitted: July 22, 2024 AEST Revised: February 24, 2025 AEST Accepted: February 27, 2025 AEST

DOI: 10.34239/ajops.130905

Australasian Journal of Plastic Surgery

Vol 8, Issue 2, 2025

Introduction

The abdominal wall protects the internal organs and facilitates core stability and movement. It comprises several distinct layers, including skin, fascia and a series of muscles enveloped by aponeuroses. Deeper layers include fascia, fat and the peritoneum. Cutaneous sensation is primarily mediated by the ventral rami of the thoracic and lumbar nerves, with intercostal, subcostal and iliohypogastric/ilioinguinal nerves distributing sensation in a dermatomal pattern.

Operations involving the abdomen can affect the cutaneous innervation of the abdominal wall. Diminished sensation caused by incisions or instrumentation of the abdominal wall can leave patients vulnerable to abdominal wall injury, including burns. Abdominal burns post-surgery may occur due to a reduced ability to sense heat, for example, from heated or warmed objects used for pain management. This can result in burns of varying degree and size. These burns may cause significant discomfort and scarring, require multiple further procedures and severely prolong recovery time for the patient. In this report, we present our recent experience with a patient who presented to a Level 1 burns centre and underwent operative management of full thickness thermal burns to the abdomen post elective cosmetic abdominal surgery. We also review published case reports on abdominal burns after abdominoplasty, cosmetic surgery, hysterectomy or any abdominal surgery.

Case

A 33-year-old female presented with a 2 per cent total body surface area full thickness thermal burn to her abdomen from a heat pack. She underwent an abdominoplasty 10 days prior. She experienced some postoperative pain and used a microwavable heat pack four times over two consecutive days, each time for approximately

45 minutes over her abdominal binder. Two days later the patient noted a dry eschar forming over her periumbilical area and presented to her surgeon, who subsequently directed her to a burns centre (**Figure 1**). The patient underwent three procedures for debridement and vacuum-assisted closure over a period of a week until the area was prepared adequately for skin grafting on

^a Corresponding author: Sinem Gultekin BBiomedSci (Hons), MD; s.gultekin@alfred.org.au

to the musculoaponeurotic layer of the abdominal wall (**Figure 2**). The total length of stay in hospital was 21 days. The patient was discharged with ongoing dressings in the community with specialist outpatient follow-up and healed with no complications. Eight months later the patient underwent staged reconstruction with bilateral flank tissue expanders to revise the initially grafted area. Advancement of the expanded abdominal skin bilaterally was performed as a revision abdominoplasty in a fleur-de-lis pattern two months later. The patient was discharged with no complications (**Figure 3**).



Fig 1. Initial presentation and extent of burn



Fig 2. Two months after split thickness skin grafting



Fig 3. Three months after removal of bilateral flank tissue expanders and revision abdominoplasty

Discussion

Abdominal burns after abdominal wall surgery are uncommon, however they are serious and avoidable.¹⁻⁴ An abdominoplasty involves extensive dissection of the abdominal wall, which can place the sensory nerves at risk. During the procedure, the surgeon creates a large flap by undermining the skin and subcutaneous tissue from the underlying muscles. This dissection can inadvertently sever nerve fibres that traverse the lateral and inferior abdominal wall. Injury to these nerves may result in numbness, altered sensation or even neuropathic pain. Strategies to minimise the risk of this include restricting the lateral extent of dissection, and identifying and preserving neurovascular perforators.

Individual patient factors play a pivotal role in abdominoplasty. A higher body mass index often correlates with a thicker pannus. The overall thickness of the pannus itself can dictate the aggressiveness of the resection needed to achieve a desirable contour, thereby increasing the exposure of underlying nerves. Moreover, the volume of pannus removed directly influences the extent of surgical dissection, increasing the risk of damaging lateral nerve branches. Additionally, the necessity for increased lateral undermining to facilitate a tension-free closure can further compromise the integrity of neurovascular structures.

There is a paucity of published literature on burns following cosmetic abdominal wall surgery, with only two published research articles discussing similar cases.^{1,2}

Sarifakioglu and Sarifakioglu's study highlights the case of a 47-year-old woman who suffered a barbecue-heat-induced burn on her abdomen, having undergone an abdominoplasty procedure three years prior.¹ The patient had been at a picnic wearing a loose shirt when she felt a burning sensation on her abdomen but ignored it. She noted

erythema and blister formation on her abdomen later that evening. The patient presented 40 days later with an infected full thickness burn. She was treated with oral antibiotics and daily dressings. The authors suggest that patients should be advised about the damage to cutaneous sensory nerves during an abdominoplasty and that the skin may be more susceptible to injury.

Similarly, Özgenel Ege and Özcan's study details the case of a 53-year-old woman who developed a heating-pad burn on her abdomen following an abdominoplasty procedure.² The patient used a heating pad for pain relief three weeks after her surgery. Upon removal, erythema and blister formation occurred and the patient suffered a superficial dermal burn that healed with conservative management over a period of three weeks. The authors emphasise the importance of patient and surgeon education regarding the proper use of heating pads and caution against leaving them on for extended periods, particularly in the immediate postoperative period.

Both studies underscore the potential dangers of heat therapy in the context of abdominal burns, particularly after a surgical procedure. Patients may be more vulnerable to burns during the postoperative period due to compromised skin integrity and reduced sensation.⁵ Additionally, the use of heat therapy may increase blood flow to the area, making it more susceptible to injury.³

To prevent these types of injuries, surgeons should educate patients on the proper use of heat therapy and caution against leaving heat pads or packs on for extended periods. Furthermore, education is imperative on the dangers of combining heat packs with postoperative analgesia, which can cause drowsiness and reduce patient awareness of injury. Patients should also be advised to avoid the use of heat therapy for at least two weeks following an abdominoplasty procedure or until the skin has fully healed. In cases where heat therapy is deemed necessary, patients should use a low heat setting and monitor the area closely for any signs of discomfort or injury.

In autologous breast reconstruction, especially following transverse rectus abdominus myocutaneous (TRAM) and deep inferior epigastric perforator (DIEP) flap procedures, there is a significant risk of thermal injuries due to sensory impairments at both the donor and recipient sites. These sensory changes result from the inevitable severing of cutaneous nerves during

flap harvesting, leading to diminished sensibility and compromised thermoregulatory responses, such as vasodilation and sweating. The literature documents several cases where patients have experienced serious burns from routine activities like sunbathing, which often occurred because the patients were unaware of their reduced heat sensation. Alexandrides and colleagues⁶ reported instances where patients sustained full thickness burns post-TRAM flap reconstruction during sunbathing in dark-coloured swimsuits, with most incidents occurring within four months post-surgery. Similarly, Enajat and colleagues⁷ describe cases following DIEP flap reconstruction where patients suffered burns between two and 18 months postoperatively, from sunbathing or simply being in a warm environment or under hot water. Mohanna and colleagues⁴ also highlight this issue, reporting burns not only on the reconstructed breast but also on the abdominal donor site, emphasising the necessity for patient education about the wound's vulnerability to thermal injuries and practical daily precautions.

These reports collectively underscore the acute need for comprehensive patient education and preventive strategies immediately following surgery. Patients should be clearly informed about the risks of thermal injuries and advised on specific protective measures, such as avoiding prolonged sun exposure, wearing lighter clothing and monitoring the temperature of their surroundings. Moreover, as sensory nerve coaptation techniques advance and become more commonplace,⁸⁻¹⁰ their role in potentially reducing these risks should be considered and discussed with patients as part of the surgical planning process. The ultimate goal is to maintain excellent cosmesis while minimising the risk of such postoperative complications, ensuring patient safety and satisfaction in breast reconstruction outcomes.

Conclusion

Abdominal burns from heat packs or pads are a serious complication that can occur following any abdominal procedure. Patients should be educated on the potential risks of heat therapy and advised to use caution when using heat pads or packs. Healthcare providers should also monitor patients closely for any signs of discomfort or injury following any abdominal procedure, particularly in the immediate postoperative period. With proper education and caution burns can be prevented.

Patient consent

Patients/guardians have given informed consent to the publication of images and/or data.

Conflict of interest

The authors have no conflicts of interest to disclose.

Funding declaration

The authors received no financial support for the research, authorship and/or publication of this article.

References

- 1 Sarifakioglu E, Sarifakioglu N. Barbecue-induced burn: an unexpected complication of abdominoplasty. *Eur J Dermatol.* 2011;21(2):300–301. <https://doi.org/10.1684/ejd.2011.1308> PMID:21489915
- 2 Özgenel Ege GY, Özcan M. Heating-pad burn as a complication of abdominoplasty. *Br J Plast Surg.* 2003;56(1):52–53. [https://doi.org/10.1016/S0007-1226\(03\)00014-6](https://doi.org/10.1016/S0007-1226(03)00014-6) PMID:12706153
- 3 Floros C, Davis PK. Complications and long-term results following abdominoplasty: a retrospective study. *Br J Plast Surg.* 1991;44(3):190–194. [https://doi.org/10.1016/0007-1226\(91\)90125-4](https://doi.org/10.1016/0007-1226(91)90125-4) PMID:1827355
- 4 Mohanna PN, Raveendran SS, Ross DA, Roblin P. Thermal injuries to autologous breast reconstructions and their donor sites—literature review and report of six cases. *J Plast Reconstr Aesthet Surg.* 2010;63(3):e255–e260. <https://doi.org/10.1016/j.bjps.2009.06.040> PMID:19682963
- 5 Farah AB, Nahas FX, Ferreira LM, Mendes Jde A, Juliano Y. Sensibility of the abdomen after abdominoplasty. *Plast Reconstr Surg.* 2004;114(2):577–582; discussion 583. <https://doi.org/10.1097/01.PRS.0000128356.93462.7B> PMID:15277836
- 6 Alexandrides IJ, Shestak KC, Noone RB. Thermal injuries following TRAM flap breast reconstruction. *Ann Plast Surg.* 1997;38(4):335–341. <https://doi.org/10.1097/00000637-199704000-00005> PMID:9111891
- 7 Enajat M, Rozen WM, Audolfsson T, Acosta R. Thermal injuries in the insensate deep inferior epigastric artery perforator flap: case series and literature review on mechanisms of injury. *Microsurgery.* 2009;29(3):214–217. <https://doi.org/10.1002/micr.20601> PMID:19230005
- 8 Spiegel AJ, Menn ZK, Eldor L, Kaufman Y, Dellon AL. Breast reinnervation: DIEP neurotization using the third anterior intercostal nerve. *Plast Reconstr Surg Glob Open.* 2013;1(8):e72. <https://doi.org/10.1097/GOX.0000000000000008> PMID:25289267 PMCID:PMC4186303
- 9 Bubberman JM, Brandts L, van Kuijk SMJ, van der Hulst R, Tuinder SMH. The efficacy of sensory nerve coaptation in DIEP flap breast reconstruction—preliminary results of a double-blind randomized controlled trial. *Breast.* 2024;74:103691. <https://doi.org/10.1016/j.breast.2024.103691> PMID:38401421 PMCID:PMC10904190
- 10 Beugels J, Bijkerk E, Lataster A, Heuts EM, van der Hulst RRWJ, Tuinder SMH. Nerve coaptation improves the sensory recovery of the breast in DIEP flap breast reconstruction. *Plast Reconstr Surg.* 2021;148(2):273–284. <https://doi.org/10.1097/PRS.00000000000008160> PMID:34398080



CC-BY-4. This is an open access article distributed under the Creative Commons Attribution 4.0 International License (CC-BY-4) which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited. View this license's legal deed at <http://creativecommons.org/licenses/by/4.0> and legal code at <http://creativecommons.org/licenses/by/4.0/legalcode> for more information.