



# Clinical Communications: Adult

## GLUTEAL BURNS FROM A CAR SEAT HEATER IN A NEUROLOGICALLY INTACT PATIENT: A CASE REPORT

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**Abstract—Background:** Car seat heaters are an increasingly common amenity in vehicles in the United States, but they have been shown to place neurologically impaired patients at risk for significant burns. **Case Report:** We discuss the case of a neurologically intact and otherwise healthy 49-year-old man who presented to the Emergency Department with second-degree gluteal and posterior upper thigh burns after using a car seat warmer for 8 consecutive hours. At no point during the course of his drive did he experience discomfort beyond feeling slightly warm. The patient was treated with supportive therapy and standard wound care, and he had a full recovery after 10 days. We review the pathophysiology of burns and discuss how seat heaters can place even neurologically intact patients at risk for significant burn injuries. **Why Should an Emergency Physician Be Aware of This?:** Our case is the first published report of a neurologically intact patient sustaining significant burns from the use of a car seat heater. This case illustrates that burn injuries can develop after prolonged exposure even at low temperatures. Emergency physicians should perform a careful skin examination on all patients presenting with gluteal discomfort in whom a history of car seat warmer use is obtained. © 2019 Elsevier Inc. All rights reserved.

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### INTRODUCTION

Car seat heaters are an increasingly popular addition to vehicles sold in the United States, providing increased

comfort while driving during cold weather. Seat warmers have been known to malfunction, however, resulting in burns and, occasionally, the combustion of car seats, with thousands of cars subsequently being recalled (1). Several case reports have documented second- and third-degree burns due to seat warmer use, affecting individuals with impaired mobility or neurologic impairment and diminished sensation, the latter resulting in delayed discovery of the burns (1–3). We report on an unusual case of a neurologically intact individual who sustained second-degree burns from prolonged contact with a car seat warmer.

### CASE REPORT

A previously healthy 49-year-old man presented to the Emergency Department (ED) with a chief complaint of pain and blistering to his buttocks. The patient had been driving his vehicle on a family trip, driving without interruption for a total of 8 hours. He had previously installed seat warmers in the front passenger's and driver's seats of his vehicle and kept the driver's seat warmer on for the duration of his journey. During the drive he endorsed feeling some mild gluteal warmth but had no other complaints.

Upon arrival to the ED the patient endorsed the progressive onset of burning pain to his buttocks and posterior upper thighs. The pain developed over 1–2 hours after exiting his vehicle. He also noticed the formation of

“blisters,” several of which had spontaneously ruptured. He denied bleeding from these lesions and was only mildly uncomfortable so long as no pressure was applied to the affected region.

On initial examination, the patient was in no obvious distress, was lying on his side on a gurney, and was breathing comfortably on room air. His vital signs were normal. His skin examination revealed partial thickness burns to his bilateral gluteal regions and posterior proximal thighs, with several tense 1- to 2-cm bullae (Figure 1). These were tender on palpation but showed no evidence of bleeding or purulent exudate. The surrounding skin demonstrated mild erythema with blanching and mild tenderness to palpation. No induration of the skin was present, Nikolsky sign was negative, and there was no palpable crepitus. The skin of the perineal and genital regions was unaffected, and the patient was neurologically intact. He had normal perfusion distal to the site of injury.

The patient was treated with nonsteroidal anti-inflammatory drugs and the application of silver sulfadiazine cream, along with a tetanus toxoid-diphtheria-pertussis vaccination. He was discharged home with bacitracin cream, a prescription for meloxicam, and instructions for home wound care. He was advised not to pop the blisters and to use cushioning of his gluteal region for comfort. The patient was able to tolerate watching a baseball game by sitting on a padded neck pillow in-



**Figure 1.** Superficial partial thickness burns to the gluteal region and posterior proximal thighs with bulla formation sustained after prolonged contact with a car seat warmer.

tended for airline travel and enjoyed good control of his symptoms with his prescribed meloxicam. Several bullae ruptured spontaneously, which provided additional pain relief.

Upon returning home, the patient followed up with his primary care physician as instructed. He abstained from using his seat warmer on the drive home. By day 7 after his initial injury he reported full resolution of the pain. By day 10 his skin had returned to its normal appearance. He had no sequelae and endorsed a full return to his baseline state of health when contacted in follow-up.

## DISCUSSION

Seat warmers are increasingly popular automobile modifications, and their popularity has resulted in numerous case reports and subsequent automotive recalls due to burn injuries. The majority of these injuries have occurred in neurologically impaired individuals, such as those suffering from spinal cord injury or diabetes, with the remainder comprised of patients with impaired mobility, such as children or patients with muscular dystrophy (4). The case presented here represents the first case of which we are aware in which a neurologically intact patient sustained significant burns from prolonged contact with a seat warmer.

Moritz and Henriques reported a series of experiments involving porcine and human subjects, wherein the duration of exposure to a heat source was found to be causative of irreversible burn injury, independent of the temperature (5). For temperatures above 70°C, less than 1 second of exposure was necessary to produce transdermal necrosis, whereas for temperatures of 44°C, irreversible epidermal injury occurred after 6 hours of exposure. Furthermore, the development of burn injuries did not necessarily correlate with reports of discomfort: human subjects reported a “stinging sensation” between 47.5°C and 48.5°C, whereas burns were sustained without discomfort at temperatures of 47°C so long as contact with the heat source was maintained for at least 18 minutes. Temperatures below this level resulted in asymptomatic burn injuries as well, but required several hours to do so (5). These findings suggest that significant burns may occur in patients exposed to minimally elevated temperatures over a prolonged period of time, and these burns may initially be nearly asymptomatic below a certain temperature threshold. As demonstrated by our patient, this finding has important clinical consequences for neurologically intact patients in addition to those with impaired sensation or mobility.

Many manufacturers include maximum temperature points in vehicle seat warmers as a safety measure. However, actual seat surface temperatures have been found to exceed these maximum specifications. One series of tests

performed by the Lenexa, Kansas company Engineering Design and Testing showed that the seat warmers in one car model reached 46.1°C after 20 min on its lowest setting, and up to 65.6°C on the highest setting, with some variation, depending on the internal ambient temperature of the car (6). As shown by the studies performed by Moritz and Henriques, these temperatures are more than adequate to cause clinically significant burns given a sufficient duration of exposure (5).

In our case the patient presented with superficial partial thickness burns sustained after 8 hours of uninterrupted car seat warmer use. Given the dependence of burn severity on duration of exposure, it is likely that his wounds would have been more severe had he driven for a longer period of time. Of particular note is the fact that he was largely asymptomatic for the duration of his drive, raising the concern that more severe burns may not have presented symptomatically until well after tissue damage had occurred. Emergency physicians should be aware of the potential extent of burns inflicted by car seat heaters, including in neurologically intact patients.

#### **WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?**

This is the first reported case of significant burn injury due to the prolonged use of a car seat heater in a neurologically intact patient. Emergency physicians should be aware of the potential for injury from car seat heaters in all patients, not just in patients with sensory compromise,

such as those with spinal cord injury or diabetes. This case highlights the need for a thorough skin examination on patients presenting with gluteal or posterior thigh discomfort in whom a history of car seat heater use is discovered. Although this patient did not sustain genital or perineal burns, the finding of second-degree burns to these sites would have necessitated transfer to a burn center for further evaluation and management (7). In addition, awareness of the possibility of injury in neurologically intact individuals may have public health and industrial implications, despite attempts to include safety mechanisms in these devices.

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