

# Full thickness burns secondary to ice pack treatment in the emergency department. Hazards of cooling. A case report.

Dimitrios Kanakopoulos M.D.<sup>1,2</sup>

Harry King M.D.<sup>2</sup>

Omar Dawood M.D.<sup>1,2</sup>

Tomas Tickunas M.D.<sup>1,2</sup>

Brighton, UK.

## Case Report

### EMERGENCY MEDICINE



**Abstract:** There is no universal protocol for the cooling of patients suffering from hyperthermia. Various options are available, and their use varies greatly between emergency departments. These methods include cooled saline, cooling blankets, dampened sheets/towels and ice packs. The use of ice packs is routine in many departments as a matter of necessity despite the relative risks vs. benefits being poorly understood. The literature reports that complications of cooling treatment are rare, however, there is little information available on the rates. Here we present a case of an 81-year-old female patient who was admitted to the Emergency Department with hyperthermia secondary to a heat stroke. This was treated with ice packs applied directly onto abdominal skin, without any interface, for a prolonged time, resulting in full thickness burns to the area and requiring transfer to the local Burns Unit for expert intervention.

**Keywords:** Burns, ice pack burn, skin burns.

## Introduction

The literature reports that complications of cooling treatment are rare, however, there is little information available on the rates.<sup>1</sup> Heat stroke is defined by central nervous system (CNS) dysfunction and a core temperature greater than 40°C.<sup>2</sup> It is the most severe presentation of the spectrum of heat related injuries brought on by the failure of the body's thermoregulation mechanisms. These most commonly affect athletes secondary to exertion (exertional hyperthermia) but elderly, obese or mentally ill patients are at high risk during extreme weather conditions as with the subject of this report. The definitive management of heat stroke is full body cooling; however, the literature shows disagreement regarding the method of cooling. Scientific literature shows that the most effective method of full body cooling is immersion in ice baths / cooled water.<sup>3</sup> Although possible, this may occasionally be impractical in the emergency setting. One of the most commonly used methods is the application of ice packs or chemical cooling packs, with the general advice being application to areas where great vessels are superficial i.e., the axilla, the neck or the groin.<sup>4</sup> There is evidence to show that application to glabrous skin may provide more efficient cooling in the emergency setting.<sup>5</sup>

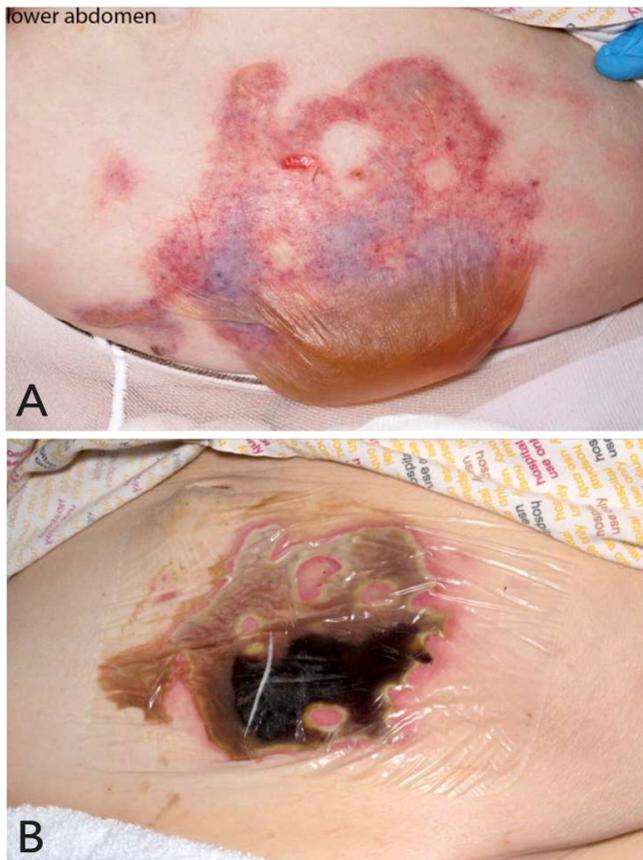
In addition, cooled IV saline and invasive cooling catheters have been used, primarily for targeted hypothermia post-cardiac events but can also

be used in the management of heat-related illness. There is as yet no definitive evidence of the risk vs. benefit of these methods in comparison to conduction and evaporation techniques.<sup>1</sup>

## Case report

An 81-year-old female presented to the emergency department with a history of collapse. She was a passenger in a car during a heatwave and insisted on wearing winter clothes. Her temperature on admission was 42°C, she suffered a further collapse in ED with a GCS of 9 and a self-limiting seizure lasting for 1-2 minutes. She was treated for heat stroke using ice packs applied directly onto the abdominal skin, without an interface, for longer than 45 minutes, which resulted in a burn to her torso with blistering and erythema (**Figure 1A**). Regretably, this was identified later in the day by the admitting medical team and treated with simple dressings as per Emergency Department protocol for a superficial partial thickness burn. Unfortunately, the burn proved to be more serious than initially thought and developed into an area of full thickness dry eschar of the abdomen within 5 days (**Figure 1B**). Due to the complications that occurred during her initial management and the delay in appropriate management of the burns sustained, the patient remained in hospital for a prolonged period of time, this unfortunately led to a hospital acquired *C.Difficile* infection further delaying her transfer to

1. Queen Victoria NHS Foundation Trust, Holtye Rd, East Grinstead RH19 3DZ, UK. 2. Brighton & Sussex University Hospitals NHS Trust, Brighton, Kemptown, Brighton BN2 1ES, UK Received on March 6, 2021. Accepted on March 12, 2021. Publishing pending.



**Figure 1. A.** Burn to suprapubic region of abdomen on original identification of injury. **B.** Medical photography of burn to suprapubic region of abdomen after 5 days showing full thickness dry eschar.

the Burns Unit. Once deemed medically stable the patient was transferred to the local Burns Unit, where she refused surgical intervention. She was subsequently treated conservatively with silver sulfadiazine cream and dressing changes with silicon-based interface and soft foam border every two days. Regular Plastics follow up was arranged till full healing achieved.

### Discussion

Hyperthermia is a condition requiring immediate attention and accurate management. Associated patient co-morbidities may aggravate its systemic effects, posing a real treat to life. In our case report, environmental exposure to unusually high temperature in conjunction to individual's failure to thermoregulate by wearing lighter clothes, led to the classic clinical presentation of heat stroke, including core temperature higher than 40°C and CNS dysfunction with a seizure. Other CNS dysfunction symptoms may be altered GCS, disorientation, stupor, and even coma.<sup>6</sup> It is imperative that core body temperature is lowered timely down to normal levels, in order to prevent serious CNS dysfunction, as well as to avoid other associated complications such as

damage to skin in the form of a burn.<sup>7,8</sup> A number of techniques are available to successfully lower core body temperature including invasive and non-invasive ones, that can be applied to appropriate individuals in the emergency setting.<sup>9</sup> These include whole-body or strategic ice packing (groin, axillae, neck), ice-water immersion, convective and evaporative cooling, that can easily be applied in the Emergency department. Peritoneal or gastric lavage are more invasive and may need the appropriate setting to be applied.<sup>9</sup>

### Conclusion

A search of the literature has failed to identify a case presentation describing an event such as this caused by management of hyperthermia. A similar case was presented in 1999 identified a similar case where ice packs were used to manage a calf sprain, and which lead to partial thickness burns to 1% of their body surface.<sup>10</sup> Every effort should be exercised by Emergency department to timely identify and effectively treat patients with heat stroke, using appropriate techniques to rapidly lower body core temperature, with respect to avoiding damage to skin, such as burns.

### Conflicts of interests

The authors have no conflicts of interest to declare

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Dimitrios Kanakopoulos  
Queen Victoria NHS Foundation Trust  
East Grinstead, UK.  
dr.kanakopoulos@gmail.com