

## A Fatal Case of Hot Air Sauna Burn in an Elderly Patient Initially Misdiagnosed as Bullous Pemphigoid

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Accepted March 3, 2011.

Sauna bathing is considered safe, and is well tolerated by most people, from children to elderly people (1, 2). Hot air sauna burns (HASB) are rare, but peculiar and potentially lethal, burn injuries. We report here a case that was initially misdiagnosed as bullous pemphigoid, with lethal evolution in an elderly patient, despite limited affected body surface area.

### CASE REPORT

An 81-year-old Caucasian man, with a medical history of hypertension, hypercholesterolaemia and prostate cancer, took a weekly sauna bath at home. During the bath, he experienced sudden weakness in his thighs without loss of consciousness. However, he could not go out of the hot steam room by himself. His carer found him lying on his back approximately 15–30 min later. He was referred to local health centre due to sudden deterioration. The next day he developed redness and progression of blisters over his lower abdomen, thighs and arms and was transferred to the department of dermatology with clinical suspicion of bullous pemphigoid. Laboratory findings disclosed an inflammatory syndrome with elevated C-reactive protein, 123 mg/l, (normal < 10). A sample from non-lesional trunk skin was excised and frozen for immunofluorescence study. In the frozen sections studied, there was no fluorescence (IgA, IgG, IgM, C3c) in the basement membrane, intercellular locations, nucleus or capillaries. No colloid bodies were found. The lack of direct immunofluorescence from non-lesional skin and his recent history of sauna bathing favoured a diagnosis of HASB. He was immediately admitted to the Helsinki Burn Centre with 8% total body surface area (TBSA) deep dermal necrotic lesions in a “uniform” pattern of HASB on the anterior thighs and lower abdomen (Fig. 1). Superficial burn injuries were noted on the upper extremities with blisters. On day 7, fascial excision of the abdominal burns was performed, followed by reconstruction with abdominoplasty.



Fig. 1. Necrotic areas of the lower abdomen, thighs and knees, displaying a “uniform” pattern of hot air sauna burns (HASB) at day 4 after exposure.

The thighs were excised fascially and covered with split-thickness skin grafts. Injuries to the knees were excised with direct closure. A week after intervention, he developed a stroke with right-sided hemiparesis and died the following day.

### DISCUSSION

The Finnish sauna is characterized by repeated cycles of short-term exposure to high temperatures, ranging from 70 to 100°C, interspersed with cooling-off periods (2). Sauna-related burns remain a rare adverse event (3), with an estimated incidence of 7/100,000 inhabitants (4). However, they account for 25% of all admissions to Burn Units annually in Finland (4–6). The injuries usually affect less than 10% TBSA and primarily involve middle-aged men. The main causes of sauna burns include: contact with the hot stove, scald, hot air, hot steam, electrical burns and flame (4). HASB involve prolonged exposure to hot air, due to immobility or loss of consciousness. The latter is mostly related to alcohol consumption, nevertheless cardiac vascular events or stroke should not be neglected.

The pathophysiology is related to a decrease in cutaneous blood perfusion with degraded cardiac achievement and low blood pressure. The skin is not cooled enough and lack of external cooling leads to skin necrosis (7). Cutaneous lesions disclose two different typical patterns of skin necrosis: a “mesh” pattern with islands of intact skin between necrotic areas; and a “uniform” pattern of larger necrotic areas (8). Necrotic areas extend deep into the subcutaneous fat and even into the muscle. Burnt areas are located on the highest-situated areas of the body according to the position of the patient (7).

Rhabdomyolysis may complicate HASB and be fatal (5). Management implies fluid resuscitation and fast surgical excision. Damaged muscle is removed, leading to bone exposure (7). Autologous split-thickness skin grafts are preferred for coverage. Several operations are necessary with gradual tissue excisions. Amputations are often performed (8, 9).

HASB may be under/misdiagnosed, but context should help in reaching the correct diagnosis and distinguishing it from any other blistering disease. Small burn injuries may be lethal to elderly people. Sauna bathing remains safe in general, but it should be recommended that elderly or fragile individuals avoid taking a sauna bath alone.

*The authors declare no conflicts of interest.*

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