

# Burn Injury Caused by Laptop Computers

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## Abstract

Laptop burn is a real condition and medical reports indicate that using a laptop across the legs can indeed cause it. In very rare cases, the condition can cause damage leading to skin cancer. A 24-year-old man presented with an asymptomatic reddish brown pigmentation on the thighs. After an extensive work-up, burning caused by use of a laptop was observed. Burning was induced in 3 days by using laptop for 4 h daily. Laptop should be used in properly ventilated and air-conditioned rooms. The most effective way of preventing erythema is to use the laptop on the table or desk.

**Keywords:** Hyper pigmentation, Laptop heating, Erythema

## Introduction

Smaller size, portability, and better battery power make the laptop more popular than ever before. Cases of laptop induced burning caused due to either defective batteries (causing chemical burns) or due to overheating of portable devices (inducing thermal injury) have been reported. Paprottka *et al.* reported a notebook-induced thermal injury on the patient's lap causing a severe second and third degree burns. As a result, a partial amputation of the left foot was carried out.<sup>[1]</sup> Laptop-induced lesions, typically found on the thighs, are mainly due to the heat generated in central processing unit (CPU), graphics processing unit, hard drive, internal CD/DVD drive, ventilation fan, and battery.<sup>[2]</sup> Recently, reports of erythema ab igne from a cellular phone have been described.<sup>[3]</sup>

We report on a case of first-degree burn due to overheating of Compaq Presario cq50 on the patient's left foot. So far, there have been a few case reports about portable computer causing burns, but until now burning induced in such a quick succession of time (3 days) has not been reported.

## Case Report

A 24-year-old boy with reddish brown pigmented and painful dry skin, with no blisters, on his left leg was reported [Figure 1].



**Figure 1:** Burning caused by laptop

Burning caused by the laptop was observed. No other skin abnormalities were stated. No further laboratory tests or skin biopsy was not performed. No medical history until presentation of this condition was reported. The patient reported that he placed the portable computer in his lap while he was sitting cross-legged and playing computer games for 4 h. An interesting thing in this case is that the erythema was caused in just 4 h within 3 days. He recognized that the laptop got hot on the left side; however, regardless of that, he did not change its position.

## Discussion

Erythema is a hyperpigmentation caused by prolonged and repeated exposure of skin mild heat in the range of 43-47°C.<sup>[4]</sup> Recently, few cases of burning due to laptop known as “laptop thigh”<sup>[5]</sup> have also been reported. However, they never

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	<b>DOI:</b> 10.4103/2141-9248.121216

resulted in just three successive days like in our reported case. Suzuki, *et al.* reported that the critical temperature for superficial burn was 37.8°C, for deep dermal burns 41.9°C and for full-skin-thickness burns 47.9°C. Moreover, augmented compression and ischemia of the affected area may cause more damage.<sup>[6]</sup>

The occurrence of erythema is usually asymptomatic; however, burning and itching have been reported by some patients. A type I diabetes mellitus patient (complicated with neuropathy and nephropathy due to severe microangiopathy) reported erythematous lesion with two blisters on her left thigh.<sup>[7]</sup> Patients having poor extremity sensation such as in paraplegia, altered consciousness (alcohol consumption), and weaken peripheral sensitivity as in diabetic neuropathy are more susceptible to such type of injuries.<sup>[8]</sup> Ostenson reported a case of penile burning caused by a laptop. After using the laptop for 1 h, the patient noticed irritation and edema of his penile prepuce. Moreover, the ventral part of his scrotal skin was red with the blister of diameter of 2 cm. After 2 days, the penile and scrotal blister broke and formed infected wounds with extensive suppuration.<sup>[9]</sup> Exposure to sub maximal heat with infrared radiation is sufficient to produce a burn inducing dermal damage.<sup>[10]</sup> Paprottka *et al.* measured the maximum temperature of 12 popular laptops and found that Samsung R780 17" was best with a maximum temperature of 390 C and minimum temperature of 190 C. Moreover, he showed that smaller laptops with 13"/15" size will get heated more quickly than 17" size of the same model. This is mainly due to faster working and compact structure of laptops, resulting in the slow heat dissipation.<sup>[11]</sup>

Furthermore, burning is caused only on the left leg as in most of the cases the optical drives of laptop are located on the left side. Major cause of laptop burning is un scientific designs of laptops. Unfortunately, the most convenient way of using a laptop is by putting on the lap, which in turn occludes the ventilation-fan exhaust and increases the computer's temperature.<sup>[2]</sup> Heat exposures at laptop positions could also induce negative effects on spermatogenesis and fertility.<sup>[11]</sup>

In most of the laptop heating cases, patients are not aware of the heat resulting in delay of the patient response. This delay could be related to the intensity of the heat, the duration of contact, and the presence of clothes between the computer and the skin. Heating can be mitigated by using a laptop in a properly ventilated and AC rooms. Cleaning the thermal hole, lifting the back and changing the battery mode, so that system will automatically adjust the running speed of CPU, will help in power saving and decrease heating. The laptop should be placed on a hard surface and not on soft surfaces like

a bed or couch. Switched-on laptop should not be placed to prevent overheating. Proper cleaning of the fan and sink (metal component reduces heat from the microprocessor) should be carried out. Universal Serial Bus device should be connected only when they are in use. Calero introduced a novel laptop desk, which provides ventilation and hence reduces the heat build-up by 15-20% in the laptop.<sup>[12]</sup>

Moreover, cooling fan can be used, which automatically starts at temperature above 45°C and stays on until the temperature gets down to normal. Finally, the most effective way of preventing erythema is to use the laptop on the table and it should not be used for a very long time.

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**How to cite this article:** Sharma G. Burn injury caused by laptop computers. *Ann Med Health Sci Res* 2013;3:S31-2.

**Source of Support:** Nil. **Conflict of Interest:** None declared.