The Electronic Gadgets Explosion Burn


ABSTRACT

With the technological progress of humans and the need to stay connected by various means of communication including laptops and smartphones, security measures must follow the qualities of computers as well as their chargers.

Explosion burns of electronic gadgets are rarely reported in the scientific literature. We report three cases of explosive burns of electronic gadgets including one by explosion of a laptop computer.

The aim of our work is to explain the explosion mechanism and emphasize the safety measures to be followed to limit this type of accident, which can be serious and sometimes fatal.

Keywords: Burn, cell phone, electrical burn, electronic gadgets, explosion, laptops.

I. INTRODUCTION

Electronic gadgets have become an integral part of everyday life. They have become a necessity and a very convenient means of communication. Studies conducted over the past two decades have determined whether the use of electronic gadgets has any adverse effects on human health [1]-[3]. It was found that the scientific literature on explosion burns from electronic gadgets is limited to a few reports [4], [5]. Through the exposure of three cases of burns by the explosion of electronic gadgets having been admitted to the national center of burns and plastic surgery and repair at the UHC IBN ROCHD of Casablanca. We will explain the mechanism of the explosion and insist on the safety measures to be followed to limit this type of accident, which can be serious and sometimes fatal. Our work aims to present the results of the use of allografts from living donors in three children as well as the social and legal implications to be given.

II. CASE REPORT

A. Case 1

A male patient, a bricklayer by profession, 27 years old. Transferred two days after the accident to the National Burn Center for extensive deep burns.

Mechanism: while working, the patient touched a high voltage electrical cable. This resulted in an electrical burn with an entry point on the left hand and an exit point on the right thigh. The cell phone (smartphone) which was in the right pocket of his pants, exploded after the passage of the electric current.

An initial loss of consciousness was reported. The CT SCAN HEAD was performed without abnormality. The patient arrived with normal blood pressure, and consciousness. On inspection, deep burns were observed on the abdominal wall, both thighs, anterior perineum, buttocks, and left hand (Fig. 1). An aponeurotomy of the left hand and forearm was performed urgently. MRI of the abdominal wall revealed necrosis of the rectus abdominis muscles and partial necrosis of the external oblique muscles (Fig. 2); the initial excision revealed necrosis of the rectus
abdominis muscle reaching the posterior aponeurosis, which was preserved, with partial necrosis of the external oblique muscles (Fig. 3). Further treatment consisted of iterative excisions to recover a healthy surface, followed by a thin skin graft (Fig. 4). The holding of the grafts marked the evolution and the patient was discharged on day 30.

On inspection, mosaic burns were observed on the forehead and cheekbones (1st degree), chin and mandibles (2nd degree superficial), and finally on the left forearm (2nd degree intermediate) with an SCB of 8% (Fig. 5). Treatment of the burn was by directed wound healing. Evolution was marked by a complete epidemic after 18 days.

C. Case 3

A 28-year-old patient, with no particular pathological history, was a victim of thermal burn by fire flame following the explosion of his laptop, which was in charge. Our patient was working on his laptop when it exploded.

The patient had superficial and deep second-degree burns on the forearms and knees (Fig. 6). The Treatment was directed wound healing with pro-inflammatory dressings combined with an antibacterial topical. Evolution was marked by a complete epidemic after 18 days.

III. DISCUSSION

Burns resulting from electronic gadget explosions can be considered a largely underreported medical problem [1]. In Morocco, many people have died in different cities of the kingdom because of electric chargers for cell phones that caused fires in their homes [6].

In March 2018 in Casablanca, A young woman aged 26 was asphyxiated, due to a fire caused by her phone in charge that exploded [7].

In May 2017, a family in Hay Moulay Rachid of Casablanca narrowly escaped death after their house caught fire. Again, the cause was an explosion of a cell phone connected to an electric charger. In Azilal, three people died
in a fire that broke out in an apartment. The fire was caused by the misuse of a cell phone charger [6].

Another fire broke out, on 26/02/2017, in an apartment in Salé. The cause, the explosion of a phone battery remained too long connected to a mains socket. The fire caused several material damages, as well as other inconveniences. Indeed, two neighbors would have been slightly asphyxiated. This accident is only the latest in a long series of incidents caused by the explosion of cell phones, inadvertently left plugged in for too long [8].

In Australia, a 36-year-old man was cycling near Sydney when he fell. A harmless fall, but his cell phone exploded in his back pocket! Result: third-degree burns on his thigh [9].

In Turkey, a 16-year-old woman suffered a 2% partial burn from an exploding cell phone [1], [10].

In Brittany, a 26-year-old medical student had her hand burned after her phone charger exploded in the middle of the night. Her room also started to catch fire because of the explosion. The young woman was using her laptop to charge a portable battery. She was in her room at her parents’ house when the battery simply exploded “like a firework”. She explains that the charger crashed into the wall and ricocheted off a carpet under her bed, causing a fire to start [11].

In Wales, an auto mechanic suffered a partial thickness burn on his body while changing the gas tank of a car he was working under when his cell phone suddenly started ringing [12].

In France. A laptop exploded in front of a 72-year-old woman while she was playing Solitaire. The explosion directly caused a flame to start, which ended up igniting the patient's blouse on fire. The computer went backward while the battery came out violently which ended up igniting also the hair of the old lady [13].

United Kingdom: a laptop computer on charge exploded during the night due to an overheating of its lithium-polymer battery. The explosion directly caused a flame to start, which ended up igniting one of the offices of a company with material damage [14].

There are no definite mechanisms as to how the explosions occurred. It could be due to a spark generated by the battery or electromagnetic waves that generate current [5], [6]. Physicists and inventors of the graphite anode for lithium-ion batteries attributed the mechanism of the explosion of electronic gadgets to the phenomenon of thermal runaway, that is, when the heat rises in the electrolyte of the battery, unwanted chemical reactions occur that accelerate the temperature increase even more. A vicious circle is set in motion and things can quickly get out of control. The similarity found between the other cases of cell phone explosions is that the explosion occurred when the victim tried to answer a phone call with a phone connected to the charger or when he was working on a PC on charge. In the case of our patients, the phone was next to the small gas canister for the first case, which exposes it to the phenomenon of heating and therefore its explosion. In the second case, the point of exit of the electric current was in contact with the smartphone of the patient which can be the cause of heating of the battery as well as the explosion of this last. However, this remains an unproven hypothesis.

Our literature search did not reveal any similar cases. The cell phone in the reported case was not defective and was in good working condition before the incident.

Although electronic gadgets can be useful, they can be dangerous if not used properly. The causes are often related to the use of non-original batteries and chargers [1], etc...

As part of primary prevention, we recommend that you avoid certain actions that may seem innocent and without risk, but are dangerous and can lead to unwanted damage -We, therefore, advise you to use original chargers and cables, or from a certified manufacturer -Unplug the charger before going to sleep -Unplug the charger once the phone is charged -Use heat resistant cases -Disable unnecessary applications -Avoid leaving the phone in the car -Do not expose the phone to the sun

IV. CONCLUSION

The use of electronic gadgets is increasing dramatically worldwide, accidents of burns and even fatal injuries caused by electronic gadget explosions have been reported on the internet and in scientific literature. Eyes should be opened to this risk, which could remind the user to use them more safely. Based on cadaveric skin.

CONFICT OF INTEREST

Authors declare that they do not have any conflict of interest.

REFERENCES