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Views and Practice

An iconic memory on skin: airbag deployment and figured burns

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Introduction

Most new car models have driver-side airbags and most of them contain passenger-side as well as side-impact airbags.[1,2] Although airbags have been proven to reduce the incidence of life threatening injuries, they have increased the risk of minor injuries such as the skin injuries.[3,4] Most airbag-related skin injuries are minor and more than 7% are burns of the upper extremity, head or neck. Fortunately, these are superficial burns that usually require only expectant therapy. However, a high index of suspicion in these circumstances is needed for diagnosis.[5] A study of the National Automobile Sampling System (NASS) found that 66% of front seat occupants exposed to an airbag deployment causes a skin injury, 47% of these injuries are attributed directly to the airbag itself.[4]

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Major damage such as bone fractures and cervical spine contusions have been reported.[6] Additional potential airbag injuries include retinal damage and high-frequency hearing loss. However, the cutaneous manifestations of airbag injury are less well known.[3]

Case report

A 38-year-old man was admitted to our polyclinic with a wound on his left arm. He explained that it occured after the accident five days ago. He suffered an injury to the left arm from the sudden deployment and rapid inflation of the airbag in the vehicle that he was driving. Dermatological examination revealed a well-demarcated annular superficial burn with a typical shape showing W figure in the centre and spared skin areas in the elbow flexure of the patient (Figure 1). He was treated with topical antibacterial and moisturising oinments. The burn regressed in two weeks without any scarring.

Discussion

Airbags are made of nylon and rubber devices and are housed in the centre of the steering wheel. In reality, they do not contain any air. Instead, they are inflatable nylon bags which are filled with combustible gases upon activation of the triggering system. The high temperature gases produce a corrosive alkaline aerosol, which can lead to chemical and thermal burns. [2,3,7,8]

Airbags reduce the risk of injury in severe car crashes, and the fatality rate may be reduced by around 6% if all cars had airbags as well as seat belts. Airbags are linked to specific injuries in motor vehicle crashes. In this case, the upper limb had a localised superficial burn in accordance with the literature. However, serious injuries directly related to explosive inflation of the airbag have been observed: these include lacerations and other skin lesions, ocular damage, ear lesions, airbag-induced asthma, cranial, cervical, or limb fractures, and even death.[1,7]

Airbag injury should be added to the list of conditions which can mimic dermatitis artefacta. An irritant contact dermatitis may be caused by the release under pressure of gases and abrasive powders, or in some cases, talc and may result in erythema, purpura or swelling on the arms, upper chest, and face. This usually resolves within a few days with scaling and pigmentation.[9]

Figure 1. Well-demarcated annular superficial burn with a typical shape showing W figure in the flexural part of forearm.

Burns due to airbag deployment are considered to take place in more than 5% of all airbag injuries and typically involve the upper extremities, head or neck. Burns from airbag injuries may be chemical, thermal or frictional, as described below.

Chemical burns

They are due to the highly alkaline aerosol which penetrates the skin as a result of contact with body liquids such as sweat or tears leading to deep tissue injuries. Chemical burns may be well-demarcated with a splash shape. Full thickness chemical burns have been described. If the eyes are affected, an ocular alkaline chemical keratitis (ocular chemical burn) may occur.[10]

Thermal burns

Thermal burns can also occur when the skin comes into direct contact with high temperature gases or overheated metallic accessories or by an indirect mechanism secondary to clothing burning and melting. These are usually superficial or partial thickness burns.[8,10]

Frictional burns

These occur when the airbag comes into direct contact with the skin, described as the slapping action of the airbag during unfolding. The friction burns appear as numerous, fine, parallel superficial erosions on an erythematous base. This type of burn always happens superficially.[10]

The typical shapes, a letter in a circle, may result from a slap-like injury causing epidermal detachment and microhaemorrhages. Although such kinds of injury may heal without scarring as in our patient, there is always possiblity of scarring especially in complex burns (frictional & thermal).

The figures are obviously caused by the design on the plastic air bag. In case of scarring, the patient will be permanently marked with the sign of brand, or company. This can be distressing to the patient and may lead to legal problems for the car/airbag companies. Fortunately, most airbag burns are minor and superficial, and only require symptomatic treatment. However, there have been reports of airbag burns requiring aggressive debridement and skin grafts.[10]

After cleansing chemical and thermal burns with copious amounts of water, treatment usually consists of topical and systemic antibiotic and corticosteroid therapy. Then the patient is closely monitored for any complications. Friction burns are less complicated and theoretically need less monitoring.[7,8,10] The superficial burn in our case also improved with topical treatment without any scarring.

Conclusion

Although the airbag system is a supplementary safety feature in cars that has proven to be life-saving in roll-over and high-velocity accidents, it is not a risk-free system. With technological advancements, it is necessary for the airbag manufacturers to augment the safety of such systems. As in our case, it is recommended avoid using metal accessories on the steering wheel, as metal emblems on the steering wheel can cause burns due to intense heat from the opening of the airbag.

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