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Liquefied Petroleum Gas Injury of the Hand

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Abstract

Liquefied petroleum gas (LPG) is currently more widely used in auto-gas by drivers as it is less expensive than petrol or diesel and produces the same amount of energy. However, it may cause serious cold injuries when body parts are exposed to it due to its quick evaporation and subsequent drop in temperature. We present a 31-year-old man with a history of gas burst injury who sustained second-degree burns to the dorsum of his right hand. It was decided to treat the burns conservatively based on the depth of the wound and severity of the involvement. The patient was followed up at regular intervals, and mobilization of the hand was started early enough to obtain a full range of motion. Our case of a gas burst injury treated with both intravenous and local antibiotic application, and early mobilization of the hand resulted in a positive outcome. LPG-related burns can be avoided to a large extent, and it is critical to increase public awareness regarding the same.

Keywords: Liquefied petroleum gas, Antibiotics, Early mobilization

Introduction

Liquefied petroleum gas (LPG) is a colorless and odorless combination of hydrocarbons (propane and butane). It is currently used as an auto-gas by drivers as it is less expensive than petrol or diesel and produces the same amount of energy. It may cause serious cold injuries due to its quick evaporation and subsequent drop in temperature [1]. The boiling point of liquid petroleum gas is between that of less volatile butane (-2°C) and more volatile propane (-45°C), and it is compressed and chilled to obtain the colorless, odorless liquid state [2]. When exposed, skin contact with depressurized, evaporating LPG can produce severe cold burns [3]. To a considerable extent, LPG-related burns can be avoided.

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While refueling the gas in his automobile, shown in figure 1, a 31-year-old man's right-hand dorsum was splattered with LPG, resulting in instant agony and diminished sensation. First aid was administered at the spot for 20 minutes using cold running water. On examination, the dorsum of his right hand revealed second-degree burns, shown in figure 2. The majority of the burn had second-degree blistering. The palm was unaffected, and the fingers were nicely perfused. The depth of the wound was unchanged 24 hours after the burn. The blister was punctured and drained, as shown in figure 3, and started on intravenous broad spectrum antibiotics, and the hand was bandaged with antibiotic ointment (combination of Bacitracin, Neomycin and Polymyxin B). The patient was kept on a functional volar slab for ten days. The patient was followed up at regular intervals, and mobilization of the hand was done to obtain a full range of motion. Figure 4 shows the hypopigmentation over dorsum of the hand with full range of motion at two months of follow-up. Figure 5 shows a clinical image of the dorsum of the hand regaining normal skin color and contour at six months follow-up.

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Figure 1: Gas leak from the cylinder of the automobile

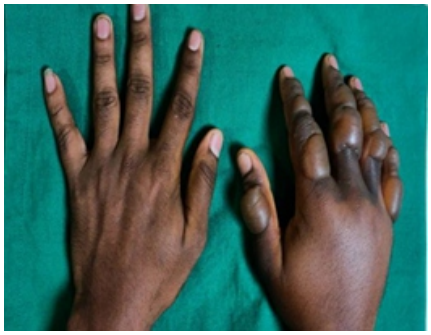

Figure 2: Dorsum of the right hand showing second-degree burns.

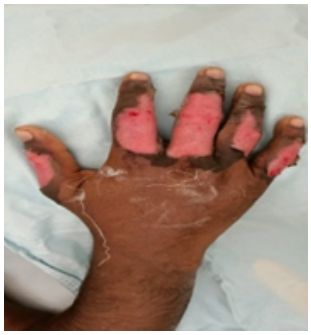

Figure 3: The blister was punctured and drained.

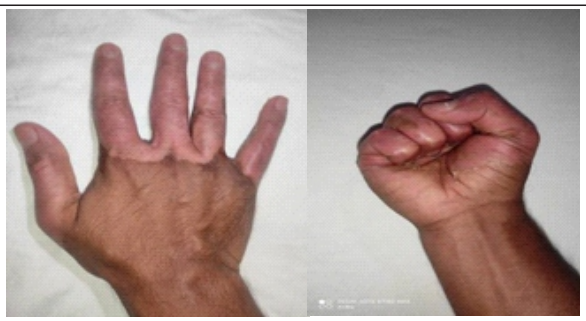

Figure 4: The hypopigmentation over dorsum of the hand with full range of motion at two months of follow-up.

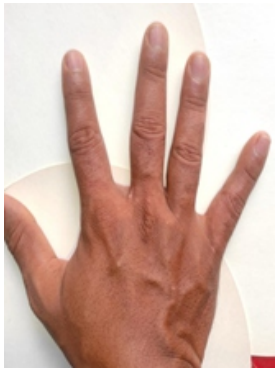

Figure 5: A clinical image of the dorsum of the hand regaining normal skin color and contour at six months follow-up.

Discussion

The significant rise in LPG-related burns is concerning and necessitates extreme vigilance. The inability to accurately assess the burn's depth makes an accurate diagnosis of the depth problematic. After exposure to LPG, tissue suffers cold damage through leaks from a pressurized system. The emergency care is extrapolated from frostbite therapy [4]. The wounded region must be placed in a warm environment as soon as possible to rewarm slowly. Initial treatment for these burns should resemble that for frostbite and involve gradual warming through liberal irrigation with water between 35 and 40 degrees Celsius. Extreme caution must be used to avoid

Case reports	Mechanism of injury	Severity of involvement	Treatment
Murgukar et al (2006) [7]	LPG splashed while refueling the car	Partial thickness burns over dorsum of hand with blisters later developing into eschar	1)Cetrimide paraffin local application 2)Tangential excision and spit skin graft
Wright et al (2006) [8]	Skin contact with LPG at fuel stations.	Partial thickness burns over dorsum of the hand	Regular analgesia, simple dressings and hand elevation.
Scarr et al (2010) [5]	LPG splashed while refueling the car	Extensive blistering as a result of a partial thickness circumferential burns	Debridement and biobrane application
Knobloch et al (2010) [9]	Superficial dermal burn of the dorsum of the hand following LPG-refueling and enlightment of a cigarette.	Extensive blistering as a result of a partial thickness circumferential burns	Debridement and biobrane application
Our case	LPG splashed while refueling the car	Partial thickness burns over dorsum of the hand	Aseptic aspiration of blisters, Neosporin ointment application, intravenous antibiotics splinting and early mobilization

Table 1: Comparing the mechanism of injury, severity of involvement and the treatment

overheating or under-cooling the affected area. A dressing or sheet, for example, should be used to cover or drape the damaged region gently. It is advisable to immerse the damaged area in the water close to or at body temperature. The extent of the injury will determine the final course of action [5]. In addition, the patient's referral to a specialized unit needs to be urgent. After the epidermis is restored, compression garments are used to avoid hypertrophic scarring [6].

Tangential excision with split skin graft wound closure, Biobrane dressing (360-micro meter thick layer of nylon fabric mesh, which is a monomolecular layer of porcine type I collagen envelopes the nylon mesh to provide a hydrophilic surface for the formation of fibrin) following wound debridement, and limb elevation with dressing garments are the several forms of conservative treatment used for hand cold burn injuries in the literature [5,6,7,8]. None of the reported cases have used antibiotics and started on early mobilization (Table 1). This is one of the few instances where an early mobilization after intravenous and local antibiotic treatment for a gas burst cold injury to the hand had a successful outcome. Burns caused by LPG may often be prevented and raising public awareness is essential.

Conclusion

A desired outcome was reported in our case of a gas burst injury treated with both intravenous and local antibiotic application, and early hand mobilization. Growing public knowledge is necessary if burns caused with LPG are to be avoided in significant part.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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