Coal Tar Burn in Emergency Room

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Abstract: Treatment of coal tar burn is a challenge to Emergency Department and there is no prescribed agent for the removal of tar. In this study, two patients with hot tar burns who were treated with Lurpak® butter along with general management of burn. Coal tar has been used for centuries in industries and coal tar also used in therapeutic management of several skin diseases. In this study, two patients with hot tar burns who were treated with Lurpak® butter are presented.

Keyword: Coal tar, Lurpak®, Emergency physician.

Introduction

Coal Tar burns are occupational usually in nature, observed mostly in male patients [1]. However, in the emergency department (ED) it may be difficult to remove coal tar without additional tissue loss due to the dense structure and high temperature of the coal tar. [2] In the literature many substances like sunflower oil and butter have been mentioned being used to remove tar from the affected area [2, 3, 4].

Previous studies suggest management of a hot coal tar burn with diesel, sunflower oil and mayonnaise. In the treatment of hot coal tar burns it is important to restrict tissue damage and prevent the further spread of the coal tar. Coal tar burn is a combine type of chemical and scald burn where both heat and chemical produces damages to skin, underlying and surrounding structures [5]. It is a very thick, dark liquid with a number of medical and industrial uses Coal tar is one of the by-products when coal is made into coke and coal gas [6]. Tar is a commonly used material especially in areas such as surfacing roads, tiling roofs and waterproofing cars [5].

Tar can be obtained using dry distillation from coal, stones, and various kinds of wood. The boiling point of paving tar is 140°C, thus skin burns from tar may be severe and deep. Various studies mentioned that occupational burns account for 10-45% of all burn events.

Tar burns constitute 60.3% of all chemical burns whereas, of all burn cases only a small proportion are from hot tar. Coal tar was discovered around 1665 and used for medical purposes as early as the 1800s. It is on the World Health Organization’s List of Essential Medicines, the most effective and safe medicines needed in a health system. Coal tar may be used in two forms: crude coal tar or a coal tar solution [6, 7]. Coal tar is used in medicated shampoo, soap and ointment, as a treatment for dandruff and psoriasis, to kill and repel head lice. Paracetamol is the only coal-tar derived analgesic still in use. Industrial phenol is now usually synthesized from crude oil rather than coal tar. Coal tar is also used to manufacture paints, synthetic dyes and photographic materials [8].

According to the FDA, coal tar concentrations between 0.5% and 5% are considered safe and effective for psoriasis. Working with coal tar such as during the paving of roads or working on roofs increases the risk of cancer. It is believed that their metabolites bind to DNA, damaging it. Long-term skin exposure to these compounds can produces tar warts which can progress to squamous cell carcinoma .It is a keratolytic agent agent, which reduces the growth rate of skin cells and softens the skin's keratin, [9,13]. It is notable as one of the first chemical
substances proven to cause cancer from occupational exposure, during research in 1775 on the cause of chimney sweeps’ carcinoma [8]. People can be exposed to coal tar pitch volatiles in the workplace by breathing them in, skin contact, or eye contact [10]. The Occupational Safety and Health Administration (OSHA) has set the legal limit (permissible exposure limit) for coal tar pitch volatiles exposure in the workplace as 0.2 mg/m3 benzene-soluble fraction over an 8-hour workday.

The National Institute for Occupational Safety and Health (NIOSH) has set a recommended exposure limit (REL) of 0.1 mg/m3 cyclohexane-extractable fraction over an 8-hour workday. At levels of 80 mg/m3, coal tar pitch volatiles are immediately dangerous to life and health.

The boiling point of paving tar is 140°C, thus skin burns from tar may be severe and deep. From various studies it is reported that occupational burns account for 10-45% of all burn events. Tar burns constitute 60.3% of all chemical burns whereas, coal tar causes few portion of all burn cases.

**Case 1**

A young man paving worker was injured by hot tar, were admitted in emergency department Fig: 1 shows all left side of the face is covered with the coal tar and initially treated with lupark butter applied over the areas and edges of burnt area. Fig:2 shows some part of right side of face involved, on 2nd and 3rd phalanges of left hand, some removal in a folding way visible with underlying hyperemia of superficial burn at time of presentation, removal is in progress.

![Fig. 1: Almost whole left side of face and scalp covered by coal tar](image1)

![Fig. 2: Some part of right side of face, at Left hand, some of coal tar removed as visible on left](image2)
Case 2

He was admitted to our ED for 20 minutes after the event. On admission, his vital signs were normal. His face was covered with tar (Figure-2A). In Emergency Room, Initial treatment was given after completion of ABCDE of Primary Survey. Analgesia was given along with normal saline 0.9 intravenously. His face was successfully cleaned with Lurpak® butter. (Figure 4).

Fig. 3: Melted tar that looks closing of mouth is easily removed so mouth can be open

Fig. 4: Left hand covered by coal tar

Fig. 5: Coal tar removed mostly from lower left leg
Discussion

Hot tar burns are still a challenging clinical form of thermal injury since the removal of tar is very difficult for the emergency physician and it is still not clear which are the appropriate agents for the removal of tar [2]. In a 2008 study related to chemical burns conducted in Iran Maghsoudi et al, stated that chemical burns, accounting for 2.4% of the total admissions and of these tar burns ratio was 60.3%[1].

Tar burns were found to be common among paving workers in this study. In the same study, the male to female ratio was 10 to 1 and the mean age was 35.In both the presented cases worker were male paving workers at 23 & 45 years of age. In another study, it was reported that hot tar injuries constituted 1.4% of all admissions to Grady Memorial Hospital Burns Unit in Atlanta and 41% of the cases needed surgical management [8].

Stratta et al, stated that early excision and grafting may be required in some cases. Hot tar burns are generally localized on the hands and upper limbs. Sevdegul Karadas et al, august 2014 describe as hot tar burn are still a challenging clinical form because the removal of tar is very difficult for the emergency physician and there is no specific appropriate agent for the removal of tar. In this study use of diesel, sunflower oil and mayonnaise was presented.

The debridement of tar from the affected tissue without support substances is painful and relatively ineffective. In the literature, butter, sunflower oil and baby oil have been recommended for the removal of hot tar [1, 4]. In addition, other agents such as alcohol, acetone, kerosene, ether, gasoline and aldehydes have been used but these may produce systemic toxicity through absorption [1, 7]. A study conducted in Turkey by Türegun et al, reported four cases of tar burns where the tar was removed by using sunflower oil soaked gauzes on the affected parts [2].

References

1. Maghsoudi H, Gabraely N (2008) Epidemiology and outcomes of 121 cases of chemical burn in East Azarbaijan province, Iran Injury, 39:1042-6


