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CASE REPORT

Fleet Enema: A Straight Up Method of Management in Tar Burn Injuries

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ABSTRAK

Lecuran tar, walaupun dikelaskan sebagai kecederaan kimia, disebabkan oleh perbezaan mekanisma kecederaan dan kesukaran untuk mengeluarkan agen daripada kulit tanpa menyebabkan kerosakan kulit dengan lebih lanjutnya, merupakan satu masalah yang sukar untuk diselesaikan. Terutamanya, apabila pesakit pediatrik terlibat. Lecuran tar biasanya merupakan kecederaan pekerjaan dan kebanyakannya berlaku kepada lelaki dewasa. Dua kes dibentangkan di sini, seorang budak lelaki berusia enam tahun dan seorang gadis berusia 15 tahun yang mengalami luka lecuhan tar dan berjaya dirawat dengan menggunakan enema minyak mineral Fleet® dan paraffin tulle Bactigras®, yang mudah didapati di kebanyakan hospital.

Kata kunci: kecederaan perkerjaan, lecuran, minyak mineral, tar

ABSTRACT

Tar burns though classified as a chemical injury, because of the difference in mechanism of injury and the difficulty in removing the agent from skin without causing further skin damage, presents a difficult problem to solve. More so, when paediatric patients are involved. Tar burns are usually an occupational injury in nature and are observed mostly in adult males. Here we present two cases, i.e. a six-year-old boy and a 15-year-old girl who sustained tar burns and were successfully treated with Fleet® Mineral oil enema and paraffin tulle Bactigras®, readily available in a hospital environment.

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Keywords: burn, mineral oil, occupational injury, tar

INTRODUCTION

Tar is a constituent of petroleum, a black, sticky, semisolid, highly viscous material composed of complex hydrocarbon molecules. Binder present in tar composed primarily of asphalt/bitumen hardens by oxidation when exposed to oxygen in the air, producing the hard surface of tar laid roads (Lavin 2003).

In the United States, the terms asphalt and bitumen are synonymous, but their usage varies from country to country. The word tar is used in common language usage in reference to different combinations of asphalt or bitumen. In this case report, the three terms are used interchangeably.

Tar is used extensively in various industries from the making of roads, sealing roofs, hulls of ships and even in the medical industry as liquor carbonis detergens (LCD), and liquor picis carbonis (LPC) in medicated shampoo, soap and ointment. The asphalt used in pavements is commonly termed asphalt cement or paving asphalt.

We report two paediatric cases who sustained tar burn injuries and were successfully treated with Fleet® Mineral Oil enema (FME) combined with Bactigras® to remove tar.

CASE REPORT

A six-year-old boy and his 15-year-old sister presented to the Emergency Department with mixed-thickness burn injuries on both the hands and feet with hot tar. While riding a motorcycle driven by the 15-year-old along with a newly tar laid road, the front wheel got buried and in the sudden deceleration, both were thrown off landing on the road burying their hands and feet in the tar. They were wearing t-shirts and tracksuits with slippers without socks. They were taken home by bystanders, the hot tar was cooled with water and was brought to the hospital for further management. Both children had a background history of childhood asthma and were on Ventolin inhaler on a PRN (pro re nata) basis and were

Figure 1: Initial presentation of severe tar burn injuries

Figure 2: Radiological imaging showing soft tissue extension of hardened tar particles

both allergic to seafood.

One and a half hours after the accident, both were alert, conscious and oriented to time, place and person. They were of average built with fair hydration and nutrition. Their vitals were stable, and the systemic examination revealed no obvious abnormalities.

In the case of the six-year-old boy right forearm extensor surface, right and left-hand palmar surfaces, right foot dorsal surface up to about 5 cm above the ankle, left and right foot plantar surfaces were covered in tar, with areas of attempted tar removal at home by the parents showing de-epithelialized erythematous dermis (Figure 1). A total body surface area (TBSA) of 8% covered in tar. Routine baseline investigations (full blood count, renal profile, electrolytes) were within the normal range. X-rays of both hands, right forearm, both feet and left ankle showed multiple small opacities over the superficial aspect of the soft tissues representing foreign bodies embedded onto the skin (Figure 2).

The burn injuries of the 15-year-old girl were less extensive than the boy. Right foot and right hand were involved with a TBSA of 3% covered in tar.

In both cases, FME was applied as a primary dressing, with paraffin tulle as a secondary dressing. This was secured with gauze and crepe bandage. The paraffin tulle used in our institution

Figure 3: Layered dressing regime showing effective removal of solidified tar particles

is Bactigras® (Figure 3). During the admission to the Burns Unit, both patients received multi-disciplinary care in terms of physiotherapy, dietician, nutrition, medical and nursing care.

DISCUSSION

Burns caused by tar is a challenge in terms of painless atraumatic removal of the crusted tar to assess the underlying depth of burn wound. This was evident from these patients when relatives attempted manual removal initially.

Malaysian road construction utilises mainly hot mixed asphalt (HMA), which is manufactured at temperatures between 270˚F and 325˚F, and is at a temperature of 110˚F when laid. The pavement layers cool quickly, however, can retain temperatures of 93˚F before landing when spattered (Jabatan Kerja Raya Malaysia 2013).

Hot tar retains sufficient heat to produce significant burn injuries once in contact with skin by prolonged heat transfer. This has the potential to convert a partial thickness burn to full-thickness burn.

Bitumens present in tar are stable colloids which cannot be easily separated unless severely diluted by a nonpolar solvent, making it difficult to remove. They also posess thermoplastic and viscoelastic characteristics, acting as a viscous liquid at higher temperatures and as an elastic solid at lower temperatures (Luke & Rolf 2000). This enhances the mechanical challenges of achieving atraumatic removal.

Current methods utilised in the management of tar burn injuries include rapid cooling of tar to solidify the inciting agent and dissipate heat followed by gradual removal of adherent tar manually or with the use of a non-toxic solvent.

Our literature review revealed a number of substances have been described in use to remove tar. These include topical antibiotics (Neomycin), polyoxyethylene sorbitan (Tween 80, Sigma, St. Louis, MO) (Demling et al. 1980), petroleum jelly, a commercial product known as De-Solv-It (ORANGE-SOL, Chandler, AZ) (Iuchi et al. 2009), sunflower oil, baby oil, liquid paraffin, butter (Carta et al. 2015), mayonnaise, and moist-exposed burn ointment (MEBO). Some of the products act via slow solvent action, while others require continuous mechanical debridement and repeated application. However, they are costly as large quantities are required and may not be readily available in an emergency department setting and in the required quantities.

In our cases, both patients were in the paediatric range with injuries over specialised areas, hence a gentler method of removal was sought rather than attempting aggressive sharp debridement of tar, as the tar had already been cooled and further thermal injuries were unlikely.

Tiernan and Harris (1993) had previously showed the successful use of FME in the removal of tar in a 50% TBSA burn injury patient with 80% TBSA covered in tar. For both these patients in Burns unit, FME was applied over tar and surrounding skin with a layer of Bactigras® closely applied

Figure 4(a-d): Progression after completing cycles of dressing with Fleet and paraffin tulle

over, and a layer of gauze soaked with FME placed over it. The dressing was repeated twice a day.

FME, consisting of 100% mineral oil, is generally used per rectally for the relief of faecal impaction and constipation. Bactigras® a sterile open-weave paraffin tulle gauze dressing embedded with chlorhexidine, an antiseptic, is used in the dressing of minor burns, lacerations, abrasions, graft sites and leg ulcers. It contains low adherence properties which permit exudate from the wound beds to be absorbed by the secondary dressing layer. Wound infection, inflammation and overall parameters are improved while protecting the wound bed and providing a soothing effect (Chik et al. 2016; Imran et al. 2011; Imran et al. 2016; Imran et al. 2010; Imran et al. 2018; Lip et al. 2019; Tan Chor Lip et al. 2019).

It was found that with each removal of the dressing, the tar was successfully being removed as a result of the solvent action of FME and the mechanical debridement action of Bactigras® (Figure 4a-d). Both patients were encouraged to actively mobilise to assist with the mechanical debridement process.

Once all tar specks were removed twice daily via FME & paraffin tulle by Post-burn Day 3, the depths of the wounds were revealed to be 5% mixed partial-thickness burns for the six-year-old boy and 1.5% for the girl. The wound dressings was changed to silver hydrofibre dressing, once every 3-4 days, until full epithelialisation two weeks later. In our institution, we use Aquacel Ag Burn® for silver hydrofibre dressings.

CONCLUSION

Tar removal from cutaneous tissue presents a difficult challenge. The successful cases here demonstrate

a gentle, simple and effective way of removing tar from the skin in tar burn patients using a readily available product, FME, within the hospital environment. Based on this experience, the principle of early cooling to prevent further thermal injury from tar followed by application of FME together with paraffin tulle is highly recommended in the management of tar burn patients.

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