Asphalt Exposure With Underlying Partial Thickness Burns

BRIAN DRURY, MD, MEd; CALEB RENNER, BS; SAMUEL GOLDMAN, MD

CASE REPORT

A 32-year-old male construction worker presented to the emergency department (ED) with severe burns following exposure to hot paving tar. The injury occurred during a road paving operation when molten asphalt splashed onto his face and extremities. He was immediately taken to the ED by his colleagues. On physical examination, the patient exhibited multiple tar-related burn injuries, primarily affecting the face, occiput, right upper extremity (RUE), and right ear, involving a total of 4.5% of total body surface area (TBSA). His burns were noted to be a combination of superficial and partial-thickness injuries, with some areas of skin still coated in hot, sticky tar (**Figure 1**). Additionally, the patient had attempted to remove some of the tar at the scene, leading to scattered partial-thickness burns where the tar had been forcibly pulled from the skin. Immediate intervention in the ED was required to prevent further damage and complications, particularly the risk of infection and the progression of the burns. Initial burn care, including cooling with ice baths, was performed in the ED. Tar removal was achieved using bacitracin ointment, followed by debridement and application of Silvadene and Mepilex dressings. The patient was discharged with scheduled weekly follow-ups in the burn clinic for six weeks.

Figure 1. Initial presentation with heated asphalt covering the entire posterior occiput and right ear.

DISCUSSION

Coal Tar, crude oil, and asphalt oil are mineral products derived from long-chain petroleum, coal, or fossil hydrocarbons. Coal tar, a by-product of the destructive distillation of coal, is an oily, dark brown liquid known to be carcinogenic. It should not be confused with asphalt/bitumen tar, which is a semi-solid, dark material found either as a natural deposit or produced as a residue of petroleum distillation.[1] Coal tar is utilized in various urban and rural infrastructure development projects and is generally heated to around 232°C before application.

Injuries caused by coal tar are relatively uncommon. In one study of 27 hospitalized cases involving hot asphalt burns, the upper extremities were most frequently affected, with the arms being the most common injury site, followed by the head.[2] Asphalt-related burns are often severe due to the material's properties: it adheres strongly to the skin and retains heat, which can exacerbate tissue damage if not treated promptly and effectively. Rapid cooling is critical to limit thermal injury by dissipating the residual heat from the asphalt.

Coal Tar removal requires an inert agent for timely removal from the skin to prevent or minimize complications.[3] Removal can be challenging, and there is no consensus on a standardized removal method. While solvents such as kerosene and gasoline have been used, they are potentially toxic to burn-injured skin. Anecdotal reports have highlighted the use of household products, including butter, sunflower oil, and mayonnaise, but with inconsistent results.[3-7] More commonly in the ED for laceration repairs are antibacterial ointments which are generally petrolatum-based, such as Polysporin.[8] In this case, bacitracin, a readily available petrolatum-based antibiotic ointment, proved to be effective in dissolve the tar while also providing an initial barrier against infection. After successful coal tar removal, further debridement was performed at the bedside in the ED. Subsequent burn care involved regular follow-up appointments with the burn clinic and daily application of Silvadene, given the high risk of infection (**Figures 2,3**). In austere environments, early consultation or transfer to burn centers should be considered for burns involving critical anatomical areas or extensive injuries, as these wounds are prone to progression.

Figure 2. Two-week follow-up in the burn clinic shows still healing partial thickness burns to the right ear.

Figure 3. The burn healed completely within six weeks after initial debridement and daily dressing changes with Silvadene application, achieving full recovery without the need for a skin graft.

CONCLUSION

Hot asphalt and coal tar burns present unique challenges due to the material's adhesive and heat-retentive properties. Prompt cooling and effective tar removal are essential to prevent burn progression and complications. Petrolatum-based ointments, such as bacitracin, offer a safe and practical option for tar removal in the ED. This case highlights the importance of a systematic approach to asphalt burn management and the value of early intervention in improving patient outcomes.

References

1. Giannis-Aimant M, Xanthopoulou E, Riza E, Linos A. Skin Disease after Occupational Dermal Exposure to Coal Tar: A Review of the Scientific Literature. International Journal of Dermatology. 2015;54:868-879.
2. Renz BM, Sherman R. Hot tar burns: twenty-seven hospitalized cases. J Burn Care Rehabil. 1994 Jul-Aug;15(4):341-5. doi: 10.1097/00004630-199407000-00009. PMID: 7929516.
3. Carta T, Gawaziuk J, Liu S, Logsetty S. Use of mineral oil Fleet enema for the removal of a large tar burn: a case report. Burns. 2015 Mar;41(2):e11-4. doi: 10.1016/j.burns.2014.07.007. Epub 2014 Oct 11. PMID: 25312555.
4. Hohl DH, Coltro PS, Goncalves HOC, et al. Comparison Between Two Strategies of Topical Treatment in Tar Burn: A Case Report. J Burn Care Res. 2021;42(3):590-593. doi:10.1093/jbcr/iraa197.
5. Nawrocki PS, Thompson H. Using baby oil to remove asphalt from burn. Canadian Journal of Emergency Medicine. 2016; 18(3):239-240.
6. Ng K, Dalen D, Rhine D. Management of hot tar burn using vitamin e ointment containing petroleum and polyoxyethylene sorbitan. CJEM, Can. j. emerg. med. care. 2013;15(5):307-10. doi: 10.2310/8000.2013.130970.
7. Turegun M, Ozturk S, Selmanpakoglu N. Sunflower oil in the treatment of hot tar burns. Burns. 1997;23(5):442-5. doi:10.1016/s0305-4179(97)89766-5.
8. Bosse GM, Wadia SA, Padmanabhan P. Hot asphalt burns: a review of injuries and management options. Am J Emerg Med. 2014 Jul;32(7):820.e1-3. doi: 10.1016/j.ajem.2014.01.007. Epub 2014 Jan 18. PMID: 24630605.

Authors

Brian Drury, MD, MEd, Brown Emergency Medicine, Warren Alpert Medical School of Brown University, Providence, RI.

Caleb Renner, BS, University of North Carolina School of Medicine, Chapel Hill, NC.

Samuel Goldman, MD, Assistant Professor of Emergency Medicine, Brown Emergency Medicine, Warren Alpert Medical School of Brown University, Providence, RI.

Disclosures

Acknowledgment: Patient consent was obtained for this report.

Grant: None

Conflicts of interest: There are no conflicts of interest.

Author Contributions: BD and SG were initially involved in the care and stabilization of the patient. BD, SG, CR were involved in the patient follow-up, chart analysis, literature review, and drafting of the case images.

Correspondence

Brian Drury, MD
593 Eddy St.
Providence, RI, 02903
541-844-4271
brian_drury@brown.edu