

Bitumen Burns

Introduction

Bitumen is a general term that is used to describe a number hydrophobic petroleum-derived substances including petroleum, mineral tars and asphalt.

Heated bitumen, (to over 200 degrees Celsius) is used by road-pavers and roofers, and is a potential source of severe contact burns. The extent of the burn depends on the temperature and volume of the bitumen contacting the patient. Strict safety procedures can prevent life-threatening injuries, and many bitumen burns are relatively small and superficial.

Circumferentially solidified bitumen can cause vascular compromise in limbs, ventilatory problems in chest injury and airway compromise in neck/ facial injury.

In addition to usual burn first aid measures, the management of burns caused by hot **bitumen** requires specific consideration, bitumen sticks to the skin once it has cooled, and is then difficult to remove.

Cool water, as for thermal burns, remains the most important immediate first aid treatment. Once the bitumen is cooled and solidified, hydrophobic solvents can then be used to dissolve and gradually remove it.

More active removal of bitumen is generally best avoided unless a primary surgical treatment is being considered due to the depth and or location of the wound.

First Aid in the community

- Apply **cool running water** for at least 20 minutes to cool the bitumen and aid analgesia.
 - This will reduce the intensity of the burn and assist in dissipating the retained heat of the bitumen.
 - Be mindful of inducing possible hypothermia with this treatment in cases of more extensive injuries. DO NOT overcool.

- Eye burns should also be flushed with water and do not attempt to remove bitumen

- Bitumen should not be traumatically removed if it is adherent to the skin.
 - In cases of extensive injury, and when there is compromise or potential compromise to the patient's airway or circulation, rapid removal, or release via incision through the bitumen may be required. These patients should be transferred to an appropriate medical facility urgently.

- DO NOT remove clothing that is stuck to the bitumen — this may cause further injury.

- DO remove belts, rings and any other constrictions, provided doing so does not cause further damage.

- Once cooling is complete, keep the patient warm to avoid hypothermia.

Organize transport to an appropriate medical facility, where the bitumen can be removed by an appropriately trained medical practitioner.

Advice to Medical Professionals

1. First aid should be attended if not done prior to medical review.

2. Consultation with a burns specialty service is advisable.

3. Clinical Assessment

- Assess the adequacy of patient's airway and breathing in cases of significant neck and facial injuries.
- Assess for any neurovascular compromise in limb involvement, particularly in the case of circumferential bitumen deposition.
- Document the *location* and *extent* of the bitumen injury.

4. Investigations

None is specifically needed other than those required to assess possible secondary complications.

5. Removing the Bitumen

After cooling the *solidified* bitumen can be removed slowly by dissolving it with an appropriate solvent. It should be removed by an appropriately trained medical practitioner

- Coat the bitumen with the solvent to allow gentle debridement.
- Options include the use of solvents with hydrophobic molecules that can dissolve tar:
 - Liquid paraffin oil
 - Petroleum based jelly
 - De-solv-it (a commercially available citrus based solvent)

Chemical debridement of bitumen burns with alcohol, acetone or harsh organic hydrocarbon solvents such as kerosene or gasoline are **not** recommended. These have been proven to be not only *ineffective* but *harmful* for the patient, as they are painful and toxic with harsh effects on the skin.

Note that complete removal of the bitumen using solvents may take a period of days.

As a result of natural re-epithelialisation of the wound, any remaining bitumen which naturally peel off with time.

5a. Extensive and full thickness burns:

Active removal of bitumen is generally indicated in these situations, and is best carried out in the operating theatre, by a specialist burns surgeon.

A combination of surgical removal and dissolution using solvents may be required. Patients with extensive burns should be referred to a burns unit immediately.

5b. Circumferential burns:

These may be more immediately problematic in limbs, chest and neck areas as vascular supply or airway /ventilation can be compromised.

Elevation of the affected area will assist to minimise swelling. Where transfer time to a specialist burn centre is prolonged, the bitumen must be removed or at least split (incised) acutely

5c. Bitumen to the eye:

Irrigate with running water as per first aid guidelines

Analgesia and local anaesthetic drops can be administered, followed by saline irrigation.

Do **not** attempt removal of bitumen

Urgent Ophthalmological referral.



Patient coated in bitumen following workplace accident



After cooling, affected area coated in paraffin emulsifying bitumen, allowing easy removal. Fortunately, no scalp injuries as it was protected by hair

6. Disposition

The exact extent of the burns, together with the body surface area involved and the general condition of the patient will dictate when transfer to a specialized Burns Unit is indicated.

References

1. Bozkurt A et al. Treatment of hot bitumen-contact-burn injuries. Burns 34 (2008) 1053 - 1054
2. Iuchi M et al. The comparative study of solvents to expedite removal of bitumen. Burns 35 (2009), 288-293.
3. Alexander A. Et al. MEBO and hot bitumen burns. Burns 29 (2003) 863-65.
4. Burns Management Guidelines, Victorian State-wide Burns Service:
www.vicburns.org.au/
5. Baruchin AM, Schraf S, Rosenberg L, Sagi AA. Hot bitumen burns: 92 hospitalized patients. Burns. 1997;23(5):438-41.
6. Elena Garcia, Bitumen Burns Treatment Summary: First Aid and Management: The Joanna Briggs Institute , 25 May 2012.

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