



Chest wall necrosis and empyema resulting from attempting suicide by injection of petroleum into the pleural cavity

M Eskandarlou and A H Moaddab

Emerg Med J 2010 27: 616-618 originally published online June 17, 2010
doi: 10.1136/emj.2009.073486

Updated information and services can be found at:
<http://emj.bmj.com/content/27/8/616.full.html>

These include:

References

This article cites 7 articles
<http://emj.bmj.com/content/27/8/616.full.html#ref-list-1>

Email alerting service

Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Notes

To request permissions go to:
<http://group.bmj.com/group/rights-licensing/permissions>

To order reprints go to:
<http://journals.bmj.com/cgi/reprintform>

To subscribe to BMJ go to:
<http://journals.bmj.com/cgi/ep>

Chest wall necrosis and empyema resulting from attempting suicide by injection of petroleum into the pleural cavity

M Eskandarlou,¹ A H Moaddab²

¹Department of Surgery, School of Medicine, Hamedan University of Medical Sciences and Health Services, Hamedan, Iran

²School of Medicine, Hamedan University of Medical Sciences and Health Services, Hamedan, Iran

Correspondence to

Dr Mahdi Eskandarlou, Department of Surgery, School of Medicine, Hamedan University of Medical Sciences and Health Services, 105 Saeedieh Street, Hamedan, Iran; dreskandarlou_m@yahoo.com

Accepted 9 March 2010
Published Online First
17 June 2010

ABSTRACT

Hydrocarbon poisoning such as that of benzene and petroleum usually occurs accidentally by inhalation or ingestion of these cytotoxic chemical compounds. Intravenous or subcutaneous injection of petroleum compounds with intent of suicide or abuse is an extraordinary event that can result in local damage or systemic toxicity such as tissue necrosis, abscess formation, respiratory system failure and partial damage to the kidneys, the brain and the nervous system. In this article, we describe a 31-year-old man who was admitted in the surgery ward of Besat Hospital. He had widespread necrosis and infection of the chest wall soft tissue and also had empyema after a suicidal attempt by injection of 40 ml of petroleum into the left hemithorax. The patient underwent repeated surgical debridement of the chest wall necrotic tissues. With segmentectomy and flap reconstruction of the chest wall wound, he recovered completely and was discharged. Our report supports early and aggressive surgical debridement of necrotic tissue, thoracotomy tube insertion and special care of respiratory system toxicity after chest wall injection of petroleum. Regarding the basis of clinical findings and paraclinical investigations that measure lung parenchymal necrosis with empyema and fistula formation, thoracotomy and decortication with or without lung tissue resection and also chest wall reconstruction are the standard treatment of these patients.

Exposure to hydrocarbon compounds may cause injury to human health and occurs either accidentally or intentionally by ingestion, inhalation, cutaneous exposure and either subcutaneous or intravenous injection.¹ Most poisoning cases with these compounds occur in children via ingestion; however, inhalation poisoning is more common in young adolescents. Petroleum and gasoline are the most common hydrocarbons that cause poisoning, but self-injection of these hydrocarbons is rare and typically purposed by suicidal intent. The clinical picture is vastly different when hydrocarbons are taken into the body parenterally.^{2–5} Intravenous or soft tissue injection of hydrocarbons depending on the concentration of toxic constituents and the duration of their local affect may cause respiratory injury, arrhythmia, soft tissue necrosis, thrombophlebitis, abscess formation and chronic bone injury. Generally, the most common side effect of hydrocarbon poisoning is respiratory toxicity.^{1–4}

In this article, we describe a patient who injected petroleum into the left hemithorax, who presented with respiratory distress, empyema and extensive necrosis of the chest wall. We want to underline

this case for its rarity and development of severe and widespread side effects.

CASE REPORT

A 31-year old man was admitted in Besat Hospital because of the suicidal attempt to reach a goal of petroleum injection into the heart. He had tried to commit suicide 7 days ago by injection of 40 ml of petroleum into the left hemithorax and 10 ml into the left cubital fossa. He was admitted to a local hospital initially and transferred to our hospital after 7 days because of progressive respiratory distress, coughing, swelling and left-sided chest pain. The vital signs at presentation were oral temperature, 37.5°C; pulse, 110 beats per minute; respiration, 24 breaths per minute and blood pressure, 110/80 mm Hg. On the chest physical examination, severe swelling of the anterolateral part of the left hemithorax between the third and the sixth intercostal space was noted, accompanied by overlying fluctuation and tenderness. Decreased breathing sounds and dullness were considerable in left lung fields. Haziness and air fluid level in the left hemithorax were seen on chest x ray (figure 1). Laboratory findings such as those of liver and renal function tests and arterial blood gas were unremarkable except for leukocytosis characterized by a leukocyte count of 23,300/gl and erythrocyte sedimentation rate of 111. Spirometry had normal results, as well as echocardiography with an ejection fraction of 60%. Incision and drainage of chest wall collection containing pus and petroleum was performed. Necrotic soft tissues were debrided. Thoracotomy tube was inserted through the sixth intercostal space with evacuation of 2 l of petroleum-odour pus within the first day. Hydrocortisone, metronidazole and ceftriaxone were administered adjuvant to surgical intervention. In four stages, the patient underwent surgery for debridement and irrigation of the chest wall wound. Normal lung expansion was not achieved after chest tube insertion. According to the presence of the massive air leakage, the patient was evaluated by spiral CT of the chest and by bronchoscopy on the tenth day of hospitalisation. The only finding was complete collapse of the left lung with shift of the mediastinum to the right side. Left posterolateral thoracotomy was done. Operation findings were diffused empyema, lung collapse and necrosis of the inferior segment of the superior lobe of the lung with air leakage. These findings were compatible with those of pathologic investigations (figure 2). Decortication and segmentectomy were done accompanied by delayed flap reconstruction of the chest wall wound. After 2 months of hospitalisation, the



Figure 1 Petroleum injection into the chest wall and pleural cavity. Chest x ray shows left-sided empyema.

patient recovered completely and was discharged to a psychiatric care facility.

DISCUSSION

Hydrocarbons include three major groups, that is, aliphatics, aromatics and halogenics. Most cases of human poisoning are associated with aliphatic hydrocarbons such as petroleum.¹

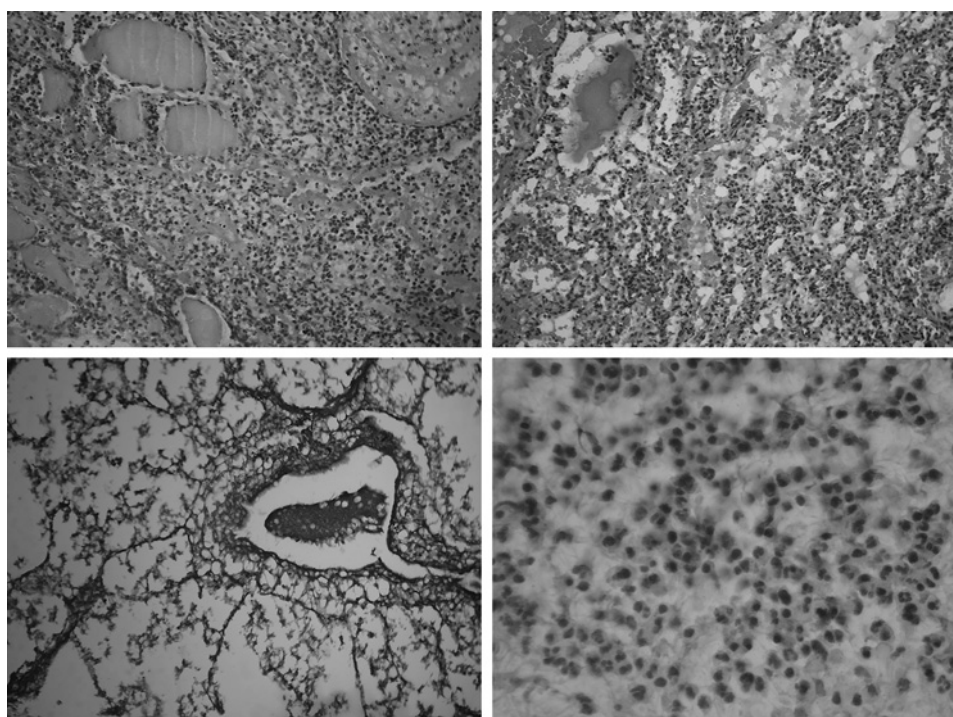
Accidental hydrocarbon poisoning and intoxications usually occur by inhalation or by percutaneous exposure. In rare cases, hydrocarbon may be injected into a vein, an artery and soft tissues including skin. Because of the cytotoxic effect of hydrocarbons, they can cause injury to the soft tissues, fat and nervous system and may lead to systemic intoxication. However, the most important system that has usually been affected is the respiratory system; the effect manifests as respiratory failure, haemoptysis, pneumonitis or acute respiratory distress syndrome.^{1 5}

Subcutaneous injection of petroleum compounds has been known to cause swelling, redness, tenderness, crepitation, necrosis and abscess formation according to the volume, the depth and the impregnation time after injection.^{1 4 6–8} In the approach to the patient who was admitted because of subcutaneous injection of petroleum compounds, two general views should be considered: first, assessment of the injection area and early local treatment as incision, drainage and frequent debridement of the necrotic tissues and second, careful investigation of the respiratory system to observe signs of hydrocarbon intoxication such as tachypnoea, distress, atelectasia, pneumothorax and pneumatocele.^{1 2 5 9}

According to the clinical and paraclinical investigations, our patient indicated respiratory intoxications due to direct injection of petroleum into the lung tissue, the pleural cavity and the chest wall. Daily clinical examination and radiologic studies showed massive air leakage from tube thoracotomy. Lung collapse, persistent leukocytosis and elevated erythrocyte sedimentation rate (>100) all indicated bronchopleural fistula that was due to toxic and necrotising effect of injected petroleum into the lung. This thesis was confirmed by operative and pathologic findings in our patient. Empyema developed secondary to the lung parenchymal necrosis by direct petroleum injection into the lung tissue, and then superimposed bacterial infection might occur. However, no bacterial growth was noted in empyema liquid and blood samples at 72 h. This may be due to empiric antibiotic therapy initiated before patient admission in our hospital.^{1 5 10}

According to the pathophysiology of these complications, spontaneous fistula repair and lung expansion was not possible after 2 weeks of supportive care. Therefore, thoracotomy was necessary for empyema treatment and fistula repair. This report appears to support two important aspects in the approach and management of patients who are referred with hydrocarbon injection to the chest wall. At first, if investigations demonstrate local toxic effects of these materials, which result in soft tissue necrosis and abscess formation, early and repeated surgical debridement is mandatory. Second, injection of petroleum into the pleural cavity or lung parenchyma may cause functional

Figure 2 The representative pictures of haematoxylin and eosin staining revealed empyema, necrotic lung parenchyma, pleura and necrotic soft tissues of the chest wall secondary to direct petroleum injection into the lung.



Short report

impairment and structural damage. Therefore, thoracotomy and decortication with or without lung resection might be inevitable.

Competing interests None.

Provenance and peer review Not commissioned; not externally peer reviewed.

REFERENCES

1. **Porraga M**, West JM. Hydrocarbons. In: Bania T, Brent J, Hoffman RS, *et al*, eds. *Emergency toxicology*. 2nd edn. Philadelphia, Pennsylvania: Lippincott Raven, 1998:299–313.
2. **Schonwald S**. *Medical toxicology. A synopsis and study guide*. Philadelphia, Pennsylvania: Lippincott Williams & Wilkins, 2001:624–8.
3. **Rush MD**, Schoenfeld CN, Watson WA. Skin necrosis and venous thrombosis from subcutaneous injection of charcoal lighter fluid (naptha). *Am J Emerg Med* 1998;**16**:508–11.
4. **Chen M**, Yalamanchili C, Hamous J, *et al*. Acute inflammatory response of the male breasts secondary to self-injection of petroleum jelly: a case report. *South Med J* 2008;**101**:422–4.
5. **Domej W**, Mitterhammer H, Stauber R, *et al*. Successful outcome after intravenous gasoline injection. *J Med Toxicol* 2007;**3**:173–7.
6. **Bushe CJ**. Attempted suicide by intravenous injection of lighter fuel presenting as an unusual cause of crepitus. *Hum Toxicol* 1986;**5**:347.
7. **Federmann G**, Föhlinger J, Kurtz V. When necrosis smells of heating oil. What damage fuels can do. *MMW Fortschr Med* 2000;**142**:39–40.
8. **Thaha MA**, McKinnell TH, Graham KE, *et al*. Early intervention reduces morbidity in extravasation injuries from 'lighter fuel' injection. *J Plast Reconstr Aesthet Surg* 2007;**60**:1342–4.
9. **Ryals PA**. Hydrocarbons and petroleum distillates. In: Noji EK, Kelen GD. *Manual of toxicologic emergencies*. 1st edn. New York: Medical Publishers Inc, 1989:611–21.
10. **Solak I**, Conkayali I, Aksu H, *et al*. An interesting thinner intoxication case: intrathoracic injection. *Adv Ther* 2006;**23**:502–5.

Images in emergency medicine

Useful clue in Kawasaki disease

This 3-year-old boy presented with a 5 day history of fever, ulceration of his lips, a widespread blanching maculopapular erythematous rash and bilateral non-purulent conjunctivitis.

He was also noted to have an area of marked erythema and skin peeling on the lateral aspect of his upper left arm (see figure 1). This area was centred over his BCG scar which he had received as a neonate. A diagnosis of Kawasaki disease was made.

The localized erythema affecting his BCG scar is a recognised feature in Kawasaki disease. It is believed to be secondary to cross reactivity of the heat shock proteins in the scar and the T cells.¹

The presence of this finding is a useful sign in the diagnosis of this common and potentially life threatening condition, especially in atypical cases of Kawasaki disease.

Robert L Boon

Correspondence to Robert L Boon, Salford Royal Hospital, Department of Emergency Paediatrics, Stott Lane, Salford, Greater Manchester M6 8HD, UK; robboon69@hotmail.com

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

Accepted 16 February 2009

Emerg Med J 2010;**27**:618. doi:10.1136/emj.2008.069997



Figure 1 Area of erythema centred around neonatal BCG scar.

REFERENCE

1. **Sireci G**, Dieli F, Salerno A. T cells recognize an immunodominant epitope of heat shock protein 65 in Kawasaki disease. *Mol Med* 2000;**6**:581–90.