



CASE REPORT

Self-injection of kerosene with chemical pneumonitis and abscess formation – a case report and literature review

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ABSTRACT

Introduction and aim. Kerosene, a widely available household fuel in Sri Lanka, is a common cause of accidental poisoning, especially in children, and is occasionally used for self-harm, which can cause complications such as chemical pneumonitis, abscesses, and thrombosis. Its unsafe storage practices increase the risk of accidental exposure.

Description of the case. A 16-year-old Sri Lankan male self-injected kerosene into the left cubital fossa. Although initially stable, he later developed chemical pneumonitis, left cephalic vein thrombosis, and a sterile abscess at the injection site.

Conclusion. Early multidisciplinary intervention and close clinical monitoring led to a favorable outcome. A review of the literature reveals that intravenous hydrocarbon injection, although rare, can lead to significant local and systemic toxicities.

Keywords. abscess, kerosene, pneumonitis, self-injection

Introduction

Kerosene, a widely used household fuel and solvent in low-resource settings such as Sri Lanka, poses significant public health risks due to its toxic properties and frequent involvement in accidental poisonings, particularly among children.^{1,2} While ingestion and inhalation are well-documented routes of exposure, intravenous self-injection of kerosene remains a rare and underreported method of deliberate self-harm with severe systemic complications. Chemically, kerosene consists of a complex mixture of hydrocarbons, including paraffins, naphthenes and aromatics, as well as potentially toxic compounds such as n-hexane, naphthalene and benzene.¹ Its low viscosity, low surface tension, and high volatility facilitate rapid absorption into tissues, leading to local necrosis, systemic toxicity, and, in cases of aspi-

ration or hematogenous spread, chemical pneumonitis, a life-threatening complication.^{2,3}

Although the previous literature has described kerosene-induced pneumonitis after inhalation or ingestion, reports of intravenous injection leading to concurrent complications, such as deep vein thrombosis, sterile abscess formation, and acute lung injury, are exceedingly rare, particularly in previously healthy adolescents.

Aim

This case presents a unique clinical scenario in which a 16-year-old man developed multisystem involvement after self-injection of kerosene, highlighting the need for increased clinical awareness and prompt intervention in such atypical presentations.

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By detailing this case, we aim to emphasize the novelty of this presentation, underscore the pathophysiological mechanisms of intravenous kerosene toxicity, and improve the recognition and management of similar cases in emergency and clinical settings.

Description of the case

A 16-year-old right-handed school-going adolescent male was admitted to the Teaching Hospital Anuradhapura, Sri Lanka, on February 2, 2024, at 6:50 PM, approximately one hour and 20 minutes after self-injecting 4 ml of kerosene into his left cubital fossa. He was preparing for the Ordinary Level upcoming national exam, the General Certificate of Education, conducted throughout the island.

On admission, he was conscious and rational, with a noticeable kerosene odor on his breath and an erythematous patch over the injection site. His blood pressure was 130/80 mmHg, his heart rate was 90 beats per minute and he was tachypnoeic with a respiratory rate of 28 breaths per minute and a Glasgow Coma Scale of 15. His oxygen saturation, as measured by pulse oximetry, was 100% while breathing room air, with clear lung fields on auscultation. Empirical broad-spectrum intravenous antibiotics were started, including ceftriaxone 1 g twice a day and metronidazole 500 mg every eight hours with normal intravenous normal saline for hydration.

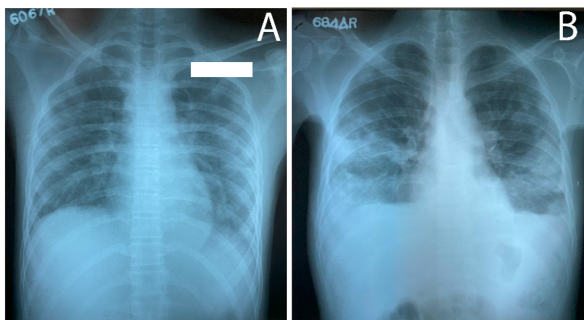


Fig. 1. Chest radiographs taken during the hospital stay, A: February 3, 2024 (day 2), normal chest X-ray, B: February 4, 2024 (day 3), evidence of pneumonitis by widespread bilateral poorly defined small opacities

On day 2, arterial blood gas analysis revealed type 1 respiratory failure (PaO₂ 7.53 kPa, PaCO₂ 3.02 kPa, pH 7.508) with respiratory alkalosis, indicating early pulmonary involvement despite a normal initial chest radiograph. This discrepancy likely reflects the limited known sensitivity of plain radiography in early chemical pneumonitis. Intravenous hydrocortisone (100 mg six-hourly) was initiated alongside oxygen therapy (2 L/min via face mask). A repeat chest X-ray (Figure 1B) on day 3 showed widespread, multiple, poorly defined, small opacities over both lung fields consistent with pneumonitis, confirming kerosene-induced pneumo-

nitis. During the next 24 hours, the patient developed worsening respiratory distress, fever, and cellulitis at the injection site.

Despite initial stabilization, his respiratory status deteriorated, and he was transferred to the intensive care unit (ICU) for close monitoring. In the ICU, oxygen therapy through a 60% venturi device, intravenous antibiotics, fluid, hydrocortisone, and subcutaneous enoxaparin.

On the fourth day of admission, acute cephalic vein thrombosis, along with soft tissue inflammation, was observed on ultrasound and Doppler imaging of the left forearm without any evidence of compartment syndrome. Intravenous heparin therapy was started to prevent further propagation of the thrombus.

On the sixth day, he was discharged from the ICU and moved to the ward. Before discharge, a psychiatrist and was prescribed sertraline 50 mg once a day. On admission, the patient was evaluated using the SAD PERSONS scale for suicidal risk,⁴ with a score of 3/10 (indicating that the risk of suicidality is low and discharge may be safe). However, no formal suicide risk assessment tool (for example, C-SSRS) was administered before discharge.

On the seventh day, he developed pain and swelling at the injection site, and an ultrasound confirmed an abscess at the cubital fossa and the biceps muscle. The incision and drainage of the abscess was performed under general anesthesia on the ninth day. The culture did not yield bacterial growth, suggesting sterile abscess formation.

Table 1. Investigations summary

	February 3	February 6	February 8	February 10	February 12
White blood cells (4–10 x10 ⁹ /L)	5.06	12.21	12	15.6	14.65
Neutrophils (40–60%)	84	86	81	82.7	60
Lymphocytes (20–40%)	12	7	13	12.1	32
Hemoglobin (12–16 g/dL)	13	13.3	13	12.6	12
Platelets (150–450 x10 ⁹ /L)	192	238	198	308	388
Blood urea (2.5–6.5 mmol/L)	–	–	3.3	–	–
Serum creatinine (45–120 micromoles/L)	73	56	52	–	–
Serum sodium (135–148 mmol/L)	137	137	138	144	–
Serum potassium (3.5–5.5 mmol/L)	3.5	4.1	3.4	4.4	–
Aspartate transaminase (0–50 U/L)	28	21	–	–	–
Alanine transaminase (0–45 U/L)	10	11	–	–	–
Gamma-glutamyl transferase (0–40 U/L)	–	16	–	18	–
Total bilirubin (3–20 micromoles/L)	–	8.6	–	–	–
Direct bilirubin (0–14 micromoles/L)	–	4.3	–	–	–
Albumin (35–55 g/L)	–	38	–	–	–
Globulin (15–35 g/L)	–	33	–	–	–
International normalized ratio (<1.4)	–	1.01	1.28	–	–
Activated partial thromboplastin time (<25 seconds)	–	34.4	37.2	–	–
C-reactive protein (0–6 mg/L)	–	382	109	49	19

Management presented a significant therapeutic challenge, requiring concurrent administration of systemic corticosteroids for chemical pneumonitis and anticoagulation for cephalic vein thrombosis. This was further complicated by the subsequent development of a sterile abscess at the injection site, raising concerns about (1) the potential risk of bleeding from combined anticoagulant and high-dose steroid therapy and (2) the possible abscess rupture with anticoagulation. We successfully managed these competing risks through clinical follow-up and maintaining therapeutic anticoagulation goals. The patient did not experience bleeding complications, and the abscess remained contained until surgical drainage on day 9.

He was discharged from the hospital on the eleventh day with a tapering course of prednisolone. His lungs were clear two weeks later and the wound healed. Refer to Table 1 for a summary of the investigations and Table 2 for the timeline.

Table 2. Timeline*

Date and time	Day	Clinical sequence
February 2, 2024	01	5:30 PM – self-injection of kerosene oil 6:50 PM – admitted to Teaching Hospital Anuradhapura
February 3, 2024	02	first chest X-ray performed – normal ABG – type 1 respiratory failure supplementary oxygen started
February 4, 2024	03	second chest X-ray done – evidence of acute pneumonitis
February 5, 2024	04	USS/Doppler – acute thrombosis of the left cephalic vein transferred to the ICU for close monitoring
February 6, 2024	05	sertraline started after a psychiatric evaluation
February 7, 2024	06	discharged from the ICU to the ward
February 9, 2024	08	large abscess over the injection site
February 10, 2024	09	incision and drainage of abscess
February 12, 2024	11	discharged
February 27, 2024		review healed wound, no lung signs

* ABG – arterial blood gas analysis, USS – ultrasound scan, ICU – intensive care unit

Discussion

We present a patient who attempted to inject kerosene intravenously, which caused chemical pneumonitis and the formation of sterile abscesses at the injection site, probably caused by accidental extravasation. There is no history of mental illness or drug addiction.

A review of kerosene or hydrocarbon injections based on a PubMed search and references (Table 3) analyzed 65 case reports and series involving 114 patients and 117 incidents (including three attempts by a single individual). Hydrocarbon injections predominantly affected men (67%, 10% unspecified gender), and 12 fatalities were reported (two unspecified genders, one female). The findings suggest that intentional hydrocarbon injections (mainly suicidal) are most common among young men with a history of substance abuse or mental illness. The route of administration had a sig-

nificant influence on clinical outcomes. Subcutaneous or intramuscular routes (76%) caused localized tissue damage (e.g., abscesses), while intravenous or intrathoracic injections (36%) led to systemic toxicity (eg arrhythmias, acute lung injury).

However, nine patients who reported intravenous injections (including five deaths) did not show evidence of pulmonary involvement. Among the deaths, four were attributed to cardiac arrhythmia, which occurred before chemical pneumonitis could develop.^{5–8} The other death was from a 39-year-old man who injected kerosene into his hemorrhoids in the mistaken belief of its therapeutic potential. He died one month later due to a myocardial infarction, a day after major surgery.⁹ In particular, two of the four deaths due to arrhythmia resulted from accidental injection of kerosene by healthcare workers.^{5,8} Only one patient was confirmed as a suicidal attempt,⁶ while the other was a homicidal act.⁷ The remaining four survivors without pulmonary involvement probably attempted intravenous self-administration but instead injected subcutaneously, as evidenced by local tissue reaction.^{10–14}

Further analysis of fatalities revealed that five of the other seven deaths were reported in a case series of 10 patients with substance use disorder,¹⁵ had multiorgan failure and acute respiratory distress,¹⁶ and in the other death, we could not obtain the full text for further analysis.¹⁷ Geographically, seven out of the 12 deaths are from Iran. Systemic complications, though rare, were severe in intravenous cases, with mortality associated with rapid absorption or high-volume injections.

Three studies from Iran and Iraq represent the most extensive documented case series of intentional kerosene injection.^{15,18,19} All three articles contextualize the socio-cultural and psychological landscape of the socioeconomically strained environment of postwar Iran and Iraq, where stigma, limited psychiatric care, and war-related trauma appear to fuel such self-destructive behaviors.

Furthermore, a case report describes the injection of mineral oil for cosmetic purposes in the USA, leading to sclerosing lipogranulomatosis.²⁰ Although only one case report was included in this review, numerous other case reports document similar complications with the injection of mineral oil subcutaneously for cosmetic purposes.

When kerosene is taken orally, aspiration occurs due to its low viscosity, high volatility, and low surface tension. As little as a milliliter of aspirated kerosene can cause significant lung injury.³ In the absence of aspiration, chemical pneumonitis will not occur.³ It is poorly absorbed through the gastrointestinal tract and, even if absorbed, does not cause pneumonitis.³ Due to the risk of aspiration, gastric lavage is contraindicated in case of kerosene poisoning.³

The mechanism of pneumonitis after hydrocarbon injection was elucidated in an elegant animal experi-

Table 3. Summary of literature (references are in supplementary file S1)^a

No	Reference	Age	Sex	Injection			Complications and outcome	Pulmonary involvement and imaging	Intention	Comorbidity, attempts, and other info	
				Route	Site	Vol					
Green 1977 USA ¹		21	M	IV	L & R cubital fossa	3–4 mL	Naphtha	Sterile abscess. Discharged on day 6	Lung involvement was not observed	Suicidal	Substance use disorder, intoxicated
Needl 1978 USA ²		31	M	IV	–	2–6 mL	Hydrocarbon insecticide	No local reaction. Left against medical advice after 3 days	Pneumonitis with patchy consolidation & atelectasis	Suicidal	Substance use disorder for 12 years
Vaziri 1979; 1980 ^{3,4}	USA ^{4,4}	40	M	IV	L cubital fossa	3 mL	Naphtha	No local reaction. Discharged on day 5	Pneumonitis, bilateral ground glass shadows, 1 pleural effusion	Suicidal	–
Erichsen 1979# ⁵	Denmark ⁵	–	–	SC	–	–	–	–	–	–	–
Kósa 1981# ⁶	Hungary ⁶	NS		IV	Arm?	20 mL	Petrol	The patient died 45 minutes after repeated seizures	Probably died before pneumonitis	Accidental injection by health care worker	After surgery
Beck 1981 UK ⁷		27	M	IV & SC	L arm	4–9 mL	Hydrocarbon insecticide	Extensive necrosis, sterile abscess discharged on day 25	Pneumonitis, alveolar & interstitial infiltrates in both lungs	Suicidal	Substance use disorder
Goldberg 1982 USA ⁸	2 cases	22	M	SC	L forearm	NS	Hydrocarbon insecticide	Two sterile abscesses. Discharged on day 9	Lung involvement was not described	Suicidal.	Substance use disorder & depression
		24	M	SC	L forearm	NS	Hydrocarbon insecticide	Sterile abscess discharged on day 9	Lung involvement was not described	Suicidal	Substance use disorder
Layton 1983 USA ⁹		38	M	SC & IM	R forearm	5 mL	Gasoline	Compartment syndrome. Ischemic contracture damage to all three major nerves. Rehabilitation for the R arm discharged on day 44	Lung involvement was not described	To get 'high'	Substance use disorder amphetamine, barbiturates narcotics
Buetti 1984 ¹⁰	#Italy ¹⁰	–	–	IV	–	–	Kerosene	Respiratory insufficiency	–	–	–
Qaryoute 1984 Jordan	2 cases ¹¹	18	F	SC	R inguinal area	5 mL	Kerosene	Abscess, major surgery, recurrent hospitalizations.	Lung involvement was not described	Non-suicidal, believed therapeutic	–
		22	M	SC	L arm	5 mL	Kerosene	Necrosis, major surgery, Recovered.	Lung involvement was not described	Assault, forceful injection	–
Saulsbury 1984 ¹²	2 admissions	9/12	M	IV	–	NS	Naphtha	Survived, developmental delay, cerebral palsy and cortical blindness	Respiratory arrest, pneumonitis	Mother injected	Child unresponsive before injection
		11/12		IV	Injected into IV line			Respiratory arrest,		Mother injected	Child placed in foster care. Mother guilty for manslaughter
Wedlin 1984 USA	2 cases ¹³	23	M	SC	R forearm	NS	Hydrocarbon insecticide	Sterile abscess. Discharged on day nine	Lung involvement was not observed	Suicidal	Paraplegic, IV drug abuse.
Gae 1985 ¹⁴	USA ¹⁴	16	M	SC	R forearm	1.5–2 mL	Turpentine	Sterile abscess	Lung involvement was not observed	Suicidal	The man came from a psychiatric hospital
		Elderly	M	IV	–	25–40 mL	Naphtha	Arrhythmia and sudden death from blunt chest trauma.	Probably died before pneumonitis	Homicidal	High concentration of naphtha in cardiac blood
Rubinstein 1985 Nixon	1985 Israel ^{15,16}	22	F	SC	Multiple sites	NS	kerosene	Multiple abscesses on the skin, epidural space, knee, etc. Acute arthritis, paraparesis, & sensory loss T8 laminectomy, but paraplegic after 18 months	Lung involvement was not observed	Homicidal (boyfriend injected after sedating with hypnotics)	He murdered his wife using the same technique
Wason 1986 USA ¹⁷		22	M	IV & SC	R cubital fossa	5 mL	Turpentine	Sterile abscess discharged on day 20	Pulmonary edema	Suicidal	Depressed, unable to offer sex change operation
Bushe 1986 UK ¹⁸		18	F	SC	R cubital fossa	2 mL	Petroleum lighter fuel	Cellulitis, no abscess, discharged on day 10	Lung involvement was not observed	DSH	–
Bozzuto 1987 USA ¹⁹		29	M	IV	R cubital fossa	12 mL	Hydrocarbon insecticide	Cellulitis, microscopic hemoglobinuria, and myoglobinuria. Transferred to psychiatric ward	Lung involvement was not observed	To get 'high'	Previous suicidal attempts. Injected previously 4 days ago, multiple injection marks
Sevcik 1992 Czech ²⁰		30	M	IV	–	8 mL	Xylene	Ventilated, hemodialyzed, GTC seizures, referred to psychiatric facility	ARDS, ventilated	Suicidal	–

Geoffray 1992 France 2 cases ²¹	24	M	SC	Both hands, the elbow folds & neck	10 mL	Naphtha	SC necrosis with abscess formation. Skin graft Diabetes insipidus.	No lung involvement was observed.	Suicidal	–
	43	M	SC	Both buttocks	0.5 mL	Petrol	Two abscesses with fistulas formed on the buttocks. Complete cure	No lung involvement was observed.	Sexual stimulation	–
Larsen 1992 USA ²² case 2	17	F	SC	Both hands	3 mL	Hydrocarbon insecticide	Abscess, compartment syndrome	No lung involvement was observed.	Suicidal	–
Rimmer 1993 UK 2 cases ²³	30	M	SC	L index finger	2 mL	White spirits	I&D	No lung involvement was observed.	Accidental	No
	45	M	SC	L thumb	NS	White spirits	Abscess ruptured spontaneously	No lung involvement was observed.	Accidental	No
Greenberg 1993 USA ²⁴	38	M	IV	NS	5–15 mL	Gasoline	Atrial fibrillation. Left against medical advice	Lung involvement was not described	DSH	Substance use disorder (IV & tobacco)
Bindlish 1993 Canada ²⁵	23	M	SC	R forearm and L pectoral muscle	NS	Gasoline	Pectoral muscle necrosis, compartment syndrome, fasciotomy of the arm and chest wall, and psychiatric evaluation; discharged on day 12	Lung involvement was not observed	Suicidal	NS
Grimmet 1996 Australia ²⁶	28	F	IV	NS	1 mL	Endosulfan in xylene 30%	Status epilepticus, rhabdomyolysis, proximal myopathy, hypoxic brain injury; discharged on day 21	Ventilated. R lower lobe pneumonia	Suicidal	Substance use disorder (IV) & 2 previous suicide attempts
Khammash 1997 ^ Jordan 3 cases ²⁷	–	–	SC	–	–	–	Severe necrotizing inflammation skin grafting	–	–	–
Rush 1998 USA ²⁸	33	M	SC	L cubital fossa	4 mL	Naphtha	Cellulitis & large abscess. Discharged on day 20	Lung involvement was not observed	Suicidal	A previous suicide attempt, depression, substance use disorder (IV)
Shustermann 1999 USA ²⁹	34	M	SC	L cubital fossa	1.5 mL	Dripless oil	Cellulitis. Discharged with psychiatry review	Lung involvement was not observed	Suicidal	Psoriasis with folliculitis, HIV, depression, two suicidal attempts
Guerquerian 2000 Canada ³⁰	18	M	IV	Cubital fossa (Side NS)	NS	Hydrocarbon	Acute lung injury discharged on day 15	Xray increased vascular markings, pulmonary oedema	Suicidal	Self-inflicted hematuria.
Aguernon 2000# Benin ³¹	18	M	IV	R upper limb	2.5 mL	Paraffin oil	Local thrombophlebitis. Necrosis and shock, Recovered	Cough & Chest pain	DSH	Anxiety neurosis
Federmann 2000 ^ # Germany ³²	26	M	SC	L cubital fossa	–	Heating oil	Necrosis & abscess. Surgical debridement with mesh graft	Lung involvement was not observed	–	–
Mussoff 2000# Germany ³³	26	M	SC	Surgically treated site of an inguinal hernia	–	Petroleum distillates	Significant localized painful swelling of the soft tissues, large colliquation necrosis of the subcutaneous tissue with petroleum odour.	Lung involvement was not observed	Self-mutilating behaviour	Recent surgical treatment of an inguinal hernia.
Buchman 2000 USA 5 cases ³⁴	54	F	IM & SC	L & R forearms	–	Raid Roach Killer	Swelling in both forearms and hands, liquefaction necrosis in multiple sites.	Lung involvement was not observed	Suicidal	History of hypertension, diabetes mellitus, alcohol abuse, and suicide attempts
	38	M	SC & ?IV	Cephalic vein by another substance abuser	–	Unknown insecticide contains hydrocarbon	Incision and drainage, the thrombosed portion of the cephalic vein was resected. Referred to a drug rehabilitation centre	Lung involvement was not observed	Not suicidal	Substance use disorder
		IM	IM	Upper extremity		Ant & roach killer	Muscle & fat necrosis, multiple debridement	Lung involvement was not observed	Suicidal	
		IM	IM	Upper extremity		Roach killer	Muscle & fat necrosis, multiple debridement	Lung involvement was not observed	Suicidal	
		IM	IM	Upper extremity		Roach killer	Muscle & fat necrosis, multiple debridement	Lung involvement was not observed	Suicidal	
Perings 2001 # Germany ³⁵	20	M	IV	NS	20 mL	Lamp oil (Liquid paraffin)	R heart failure, mild DIC, psychiatric therapy	Lipoid pneumonia	Suicidal	–
Awe 2003 Saudi Arabia ³⁶	33	M	SC	Both side of his R leg	5 mL	Kerosene	Acute necrotizing fasciitis with compromised venous return. Skin grafts were applied. Discharged cured	Lung involvement was not observed	DSH	Injected twice with kerosene, ingested razor blades. Diagnosed with personality disorder.
Solak 2006 Turkey ³⁷	53	M	IT	L hemithorax through the 5 th intercostal space	10 mL	Thinner	No local effects. Discharged on day 35. CT after 1 year of pleural thickening.	Atelectasis with massive effusions (chemical empyema) L lung CT L pleural effusion, atelectasis in the L lower lobe, and pleural thickening.	Suicidal	Major depression

Domej 2007 Austria ³⁸	26	M	IV	L cubital vein.	10 mL	Gasoline	Atrial fibrillation, multiorgan failure, BL hemorrhagic effusions ARDS, ventilated, AKI, CWH, rhabdomyolysis. Discharged for psychiatric care. 6 months after restrictive lung diseases with nodular & reticular opacities	FOB Hemorrhagic bronchopneumonia diffuse mucosal hemorrhage X–ray interstitial & BL alveolar opacities CT severe, patchy consolidations, ARDS, BL pleural effusions.	Suicidal	–
Thaha 2007 UK 3 attempts ³⁹	35	F	SC	L cubital fossa (June 1998)	3–5 mL	Lighter fluid	Compartment syndrome: surgical decompression	Lung involvement was not observed	Suicidal	Psychiatric illness
			SC	L Femoral vein (October 1998)	10 mL		Local inflammation, sterile abscess, and extensive fat necrosis. Incision and drainage done. Left to heal by secondary intention	Lung involvement was not observed	Suicidal	
			SC	Volar aspect of the right arm (March 1999)	NS		Multiple stab wounds were made on the skin under local anesthesia and a thorough saline flush out done	Lung involvement was not observed	Suicidal	
Hazani 2008 USA ⁴⁰	34	M	IM	Thighs and buttocks	5 L	Mineral oil	Multiple abscesses in the lower extremities, multiple surgeries, pneumonia, effusion & septicemia (sclerosing lipogranulomatosis) discharged after 6 months	Developed effusion and pneumonia, unlikely to be direct effect	Aesthetic	–
Amiri 2009 Iran 10 cases ⁴¹	mean 20.3 (16–26)	9M 1F	IV	Cubital vein	five > 5 mL	kerosene	5 died & 4 of them injected more than 5 mL. 7–phlebitis 6–arrhythmia 8–loss of consciousness	All had pneumonitis. No soft tissue injuries	Suicidal	All had substance use disorder (IV), 4 had previous suicidal attempts
Farahvash 2009 Iran 21 cases ⁴²	16–85	15M 6F	8SC 10IM 3 SC&IM	All injected into arm but one injected into arm & abdomen	1–30 mL mean 4.9 mL	Hydrocarbon	Compartment syndrome–13 (fasciotomy 5 skin graft 10) Abscess–5 No surgery 4 had long–term deformity	Lung involvement was not observed	Suicidal	14/21 had comorbidities. 4 Major depression 2 schizophrenia 1–epilepsy 1–migraine 7 Substance use disorder opium 5 previous suicide attempt.
Fink 2010 Germany ⁴³	22	M	IV, SC & IM	L cubital vein	7 mL	Gasoline	Cellulitis 10 cm around the injection area. Surgical debridement. Referred to psychiatrist	Multiple opacities on X-ray in the bases of the lung with bilateral effusion CT basal ground–glass opacities	Suicidal	Asperger syndrome, suicidal attempt by benzodiazepine overdose.
Rostami 2010 Iran ⁴⁴	39	M	SC?	Haemorrhoids. Repeatedly injected for 6 days	NS	Kerosene	Necrosis in the perineal region & scrotum oedema. Laparotomy and colostomy performed. Died of MI	Lung involvement was not observed	Suicidal	–
Eskandariou, 2010 Iran ⁴⁵	31	M	IT & SC	40 mL into the L hemithorax 10 mL into the L cubital fossa	50 mL	Petroleum	Decortication & segmentectomy recovered after 2 months of being sent to a psychiatric facility	Pyothorax, empyema, collapse, necrosis of the chest wall X-ray airfluid level in the L hemithorax. Complete CT collapse L lung with mediastinum shift and bronchopleural fistula.	Suicidal	–
Ra, 2011 Republic of Korea ⁴⁶	23	M	IV	NS	1 mL	Isoparaffin	Cellulitis and necrosis site of injection. Complete resolution of lung findings	X–ray ill–defined pulmonary nodules BL CT multiple, wedge–shaped, ill–defined ground glass opacities BL consolidations and BL pleural effusion	Suicidal thoughts	–
McGeary 2011 UK ⁴⁷	40	M	IV	L cubital vein	10 mL	White spirit	Soft tissue abscess in the arm–I&D	Bilateral X-ray opacities CTPA– air space consolidation	Suicidal thoughts	Substance use disorder (IV) Psychiatric history
Viper 2011 UK ⁴⁸	27	M	SC	L arm and both buttocks	40 mL	Petrol	Necrosis. Exposed necrotic muscle and fat. Discharged	Lung involvement was not observed	Suicidal	Schizophrenia, sectioned (detained in hospital)
Mahmoodpoor 2012 Iran ⁴⁹	58	M	IV & SC	R arm	10 mL	Gasoline	cellulitis R forearm fasciotomy, ventilated ARDS AKI multi–organ failure, died day 21	Symptoms of acute lung injury	Suicidal	Previous suicidal attempts.
Godaard 2012 ⁵⁰	19	F	IT	Chest	15 mL	white spirit	R effusion consolidation, pneumothorax ARDs	Symptoms of acute lung injury	Suicidal	Substance abuse disorder & depression

Nelson, 2013 USA 2 cases ⁵¹	23	M	IV	Arm R injected over 12 hours (1 mL at a time)	15 mL	Lubricant (WD-40)	The necrosis and abscess R arm. Was discharged on day 9 to inpatient psychiatric care	X-ray pulmonary edema with right lower lobe infiltrate	Suicidal (with his fiancée, case 2)	Substance use disorder IV heroin, depressed.
	29	F	SC	Dorsal aspect of R hand & wrist dorsal aspect	NS	Lubricant (WD-40)	Necrotic tissue, compartment syndrome, psychiatry unit after 12 days	Lung involvement was not observed	Suicidal (with her fiancé, case 1)	Substance use disorder IV heroin. Homeless
Liu 2013 China ⁵²	33	M	IM	Distal region of the left arm	10 mL	Phoximi (although an OP it is a complex hydrocarbon)	The distal L arm was swollen cellulitis I&D	Lung involvement was not observed	Suicidal	Past craniocerebral trauma
Omori 2013 Japan ⁵³	21	M	SC	L cubital fossa	5 mL	Spot remover fluid (hydrocarbons as solvents)	Pain, oedema, and erythema of L upper limb I&D	Lung involvement was not observed	Suicidal	Psychiatric treatment for previous suicide attempts
	34	M	SC	L hand at two sites	5 mL	Kerosene	Cellulitis left against medical advice	Lung involvement was not observed	Suicidal	Chronic alcoholic
Jayaprasad 2013 India ⁵⁴	17–25	1M 10 F	SC	Arm-8, thigh-1 buttock-1		Kerosene	Ulcer and cellulitis, one developed contracture	Lung involvement was not observed	DSH	Severe emotional tension due to social, economic and psychological problems
Sharqie 2014 Iraq 11 cases ⁵⁵	–	–	IV	–	2 mL	Benzene	Died	–	Suicidal	Chronic pain syndrome. Drug intoxication & strangulation
Hasan 2016 ⁵⁶ Bangladesh ⁵⁷	–	–	IV	–		Kerosene	–	–	Suicidal	–
Bidaki 2016 Iran ⁵⁸	17	M	SC	L forearm	5 mL	Gasoline	Necrotising fasciitis and abscess	Lung involvement was not observed	Suicidal	Cluster B personality air injection into vein, touching electrical wires, cutting body 3 times, pill overdose
Pouwels 2018 Netherlands ⁵⁹	52	M	IT	L hemithorax	NS	Benzene & paracetamol 25g	Discharged from psych care after 23 days	A respiratory insufficiency hydropneumothorax CT emphyema in the L lung and pectoral abscess	Suicidal	Substance use disorder, alcohol & tobacco, multiple TIA.
Murphy 2018 Ireland ⁶⁰	26	M	SC & IM	L forearm	15 mL	Petroleum	Compartment syndrome.	Lung involvement was not observed	Suicidal	Depression, weakness of flexors
Alquraishi 2018 Saudi Arabia ⁶¹	30	M	SC	L cubital fossa	6 mL	Kerosene	Cellulitis	Lung involvement was not observed	Suicidal	Prisoner
Asimwe 2021 Uganda ⁶²	23	M	IM	L wrist & cubital fossa.	5 mL	Kerosene & rodenticide	Seizure & compartment syndrome L wrist contractures, discharged on day 42	Lung involvement was not observed	DSH	Relationship conflict, depression,
An 2021 China ⁶³	14	M	IV	Forearm?	5 mL	Insecticide (kerosene & propyl butane)	Ventilated with complete recovery	Pneumonitis	Suicidal	Depression, suicide attempts
Arafat 2024 Bangladesh ⁶⁴	30	F	IV	Forearm?	10 mL	Kerosene midazolam amitriptyline	VT, electrolyte abnormalities, DVT, & multi-organ failure. Died	Probably died before pneumonitis	Suicidal	Major depressive disorder.
Bubalo 2024 ⁶⁵ Croatia ⁶⁶	62	M	IV	Through HD catheter	–	Medical Kerosene	Respiratory, metabolic, lactic acidosis, hypotension, & tachyarrhythmia. Died	Died before pneumonitis	Accidental injection by HCW	CKD on hemodialysis

^a AKI acute kidney injury, ARDS – acute respiratory distress syndrome, BL bilateral, CT – computed tomography, CTPA pulmonary angiogram, CVWH – continuous venovenous hemofiltration, DIC disseminated intravascular coagulation, DSH deliberate self-harm, DVT – deep vein thrombosis, F female, FOB – fiber optic bronchoscopy, GTC generalized tonic-clonic, HIV human immunodeficiency virus, IM intramuscular, IT intrathoracic, I&D – incision and drainage, IV intravenous, L – left, M male, MI – myocardial infarction, NS not stated, OP – organophosphorus pesticides, R right, SC – subcutaneous, TIA transient ischemic attack, VT ventricular tachycardia, HD – hemodialysis, HCW – health care worker, CKD – chronic kidney disease, # – non-English, * – same patient, ^ – only abstract, original case report cannot be found, in some cases data obtained from secondary sources

ment.²¹ Lungs selectively absorb hydrocarbons and excrete them through the alveoli, which is why the kerosene odor is present in the patient's breath. Increasing the minimum surface tension in the alveoli is the central mechanism of pneumonitis caused by injected and aspirated kerosene. This may be due to a direct physical action that interferes with the action of the surfactant or damage to the type 2 pneumocytes, which produce the surfactant. Type 2 pneumocytes are inactivated by kerosene oil, leading to surfactant deficiency, intra-alveolar hemorrhage, inflammation, necrosis and alveolar collapse.^{2,3}

Deep vein thrombosis may develop after large vein thrombophlebitis due to the presence of hydrocarbons.²² In addition, damage to the endothelium caused by intravenous kerosene may have facilitated the formation of thromboses, a finding that requires further research to validate. Hydrocarbons destroy membrane lipids and disrupt their integrity. It acts as a defatting agent, causing liquefaction necrosis, and can spread along tissue planes.¹⁸ The formation of an abscess at the injection site indicated the consequence of kerosene, leading to inflammatory reactions. Tissue damage and activation of innate immunity will aid in the formation of an abscess. The combination of local tissue damage and impaired immune response creates an ideal environment for abscess formation, requiring surgical intervention for drainage and wound debridement. The abscess was considered sterile based on negative results from aerobic culture.

As kerosene poisoning by injection can lead to multiple complications, vigilance for the development of such issues and prompt intervention may help to minimize morbidity and mortality. Given the widespread availability of kerosene in developing regions, greater awareness, accurate reporting, and more research are needed to understand better the complications, risk factors, and preventive strategies associated with such intentional or accidental injections.

Several limitations should be acknowledged in this case. First, the diagnosis of pneumonitis was solely on clinical presentation and serial chest radiographs, as advanced imaging (CT/HRCT) and lavage-free bronchoscopy were not performed. The patient's rapid clinical improvement justified their omission. Second, although the abscess was presumed to be sterile based on negative aerobic cultures, our setting did not have a comprehensive microbiological evaluation, including anaerobic cultures and PCR for atypical pathogens. These diagnostic limitations underscore the challenges of managing complex toxicological presentations in resource-limited environments, where clinical judgment must often supplement incomplete laboratory data.

Conclusion

Kerosene is a common household chemical that can be used for self-harm, particularly in the developing

world. Injection is one of those methods, which can lead to significant morbidity and mortality due to local and systemic complications. Chemical pneumonitis is a common consequence when kerosene enters the circulation, contributing to morbidity. A multidisciplinary approach is crucial for reducing associated complications and improving outcomes. Preventive measures are equally important and require an evaluation of the underlying psychological triggers to identify the root causes. This case highlights the complications of intravenous kerosene injection, including chemical pneumonitis, thrombosis, and abscess formation.

Declarations

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Author contributions

Conceptualization, A.W., P.W. and S.S.; Methodology, S.S.; Software, H.S. and S.S.; Validation, A.W. and T.R.; Formal Analysis, S.S. and T.R.; Investigation, A.W. and P.W.; Resources, A.W., H.S. and P.W.; Data Curation, T.R. and S.S.; Writing – Original Draft Preparation, A.W. and S.S.; Writing – Review & Editing, A.W., P.W., T.R., H.S., and S.S.; Visualization, A.W. and T.R.; Supervision, S.S.; Project Administration, S.S.

Conflicts of interest

The authors have no conflicts of interest to declare.

Data availability

The data that support the findings of this study are available from the senior authors upon request.

Ethics approval

Informed written consent has been obtained from the patient's mother, and ethics approval is not applicable for this manuscript.

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