

CASE REPORT

Fatality due to Hydrocarbon Pneumonitis Following Fuel Siphonage: A Case Report and Literature Review

DEEPTI SINHAMAR¹, MAHESH CHAND MEENA^{1*}

¹Department of Forensic Medicine and Toxicology, University College of Medical Sciences, University of Delhi, India.

Abstract

Background: Siphoning diesel from fuel tanks is a common practice among auto mechanics and garage workers, particularly in rural areas, which has a high risk of aspiration. Hydrocarbon pneumonitis is a rare and under-reported emergency medical illness caused by accidental aspiration of volatile substances such as diesel. Although the actual prevalence of this type of accident injury is unknown, it is limitedly reported. There is a paucity of literature, with only a few case reports of such events and their consequences coming from India.

Case Report: A 24-year-old male was admitted with a provisional diagnosis of chemical pneumonitis and ARDS two hours after aspiration of diesel, while siphoning it from the fuel tank. On postmortem examination, Lungs were heavy, weighing 1265 grams and 1160 grams, congested and edematous with rupture of alveoli, consolidation was seen in middle and lower lobe of the lungs, and gastrointestinal mucosal was also congested. Histologically, sheets of foamy macrophages admixed with squamous epithelial cells were seen.

Conclusion: Diesel aspiration can induce a wide range of symptoms, from a simple cough and fever to severe ARDS and death. As a result, manual siphoning should be avoided, and if it must be done, it should be done with caution. Proper history taking, including occupation and examination, accurate diagnosis, and treatment may improve the prognosis of patients suffering from hydrocarbon pneumonitis as a result of fuel siphonage.

Keywords: Hydrocarbons; pneumonitis

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INTRODUCTION

Hydrocarbons are volatile organic compounds that are used in everyday activities like cooking and transportation. Hydrocarbon pneumonitis is a rare and under-reported emergency medical illness caused by accidental aspiration of volatile substances such as diesel. Diesel aspiration can produce a variety of symptoms, ranging from mild discomfort to severe ARDS and chemical pneumonitis, as well as death. Aspiration of hydrocarbon compounds can also occur as a result of vomiting following an accident, especially in youngsters and the elderly [1]. Siphoning diesel from fuel tanks is a common practice among auto mechanics and garage workers, particularly in rural areas, with increased risk of aspiration [2]. Vomiting, diarrhea, and abdominal pain are common side effects of gastrointestinal ingestion [1]. Hydrocarbons, on the other hand, destabilize surfactants, reduce pulmonary compliance, and trigger an inflammatory reaction in the lungs [3, 4]. Symptoms might range from chronic indolent diseases to fast developing fatal diseases [3]. This route of poisoning differs from other examples of hydrocarbon pneumonitis, such as occupational exposure faced by fire eaters, accidental consumption by children, and

choking by elderly or disabled individuals [3, 6]. Hamilton described the first case of diesel aspiration pneumonitis in 1897 [7]. Although the actual prevalence of this type of accident injury is unknown, it is mostly under-reported. There is a paucity of literature, with only a few case reports of such events and their consequences coming from India. As a result, in this study, we intend to present a case of mortality followed by pneumonia caused by diesel fuel aspiration, which occurred as a result of an accidental aspiration of diesel fuel, while siphoning from the fuel tank.

CASE REPORT

A 24-year-old male presented with complaints of vomiting, frothing from mouth, sweating burning sensation in abdomen, and generalized weakness. Two hours before, he had aspirated diesel, while siphoning it from the fuel tank. Later he developed chest pain and shortness of breath. On physical examination, patient was drowsy. There was no cyanosis or peripheral edema. His pulse rate was 100 beats/min, respiratory rate was 30 breaths/ min, blood pressure was 100/60 mmHg and room air oxygen saturation was 70%. Chest examination revealed bilateral crepitation. The patient was also admitted with a provisional diagnosis of

*Correspondence to: Dr. Mahesh Chand Meena, M.D, Assistant Professor, Department of Forensic Medicine and Toxicology, University College of Medical Sciences, University of Delhi, New Delhi-110095, India.
Email: drmahe2012@gmail.com, Tel: 01123408158

chemical pneumonitis with myocarditis with Type 1 respiratory failure with ARDS in GTB Hospital. The arterial blood gas analysis at room air revealed a PH of 7.34; PaO₂ of 96 mmHg; PaCO₂ of 46 mmHg and HCO₃ of 25.4 meq/L. Blood examination revealed hemoglobin of 13.6 g/dl, total leucocyte count of 10,900/cu mm. The postero-antero chest radiograph done on the day of diesel aspiration revealed bilateral ground glass opacifications. At admission, patient required supplemental oxygen. Antibiotics, steroids, bronchodilators, and other supportive treatment was given. Later he was shifted to ICU and intubated when Spo₂ dropped down to 86% on NRBM at 15 L/m oxygen. Patient's condition further deteriorated and he was declared dead after undergoing treatment for 4 days, and shifted to morgue.

On post-mortem examination, yellowish discoloration seen all over the body. On opening the body, no peculiar smell was present. Straw colored fluid was present in chest (about 100 ml), pericardial (about 80 ml), and peritoneal cavity (about 250 ml). All the internal organs were congested with multiple petechial hemorrhages over heart and both lungs. Lungs were heavy, weighing 1265 grams and 1160 grams, congested and edematous with rupture of alveoli, consolidation seen in middle and lower lobe of the lungs, gastrointestinal mucosal was congested.

DISCUSSION

Hydrocarbons are organic compounds that are divided into two categories: aliphatic and aromatic. Petrol, diesel, kerosene, and gasoline are some of the most widely utilized hydrocarbons in daily life, mostly as transportation and household fuel. Ingestion, whether accidental or suicidal, cutaneous, and inhalational poisoning are all mechanisms of toxicity for hydrocarbons. In children, the dermal route is more common [3, 8]. In our case, the mode of exposure was accidental aspiration, while siphoning. Because diesel has a low viscosity and volatility, it is more likely to cause aspiration [9].

Hydrocarbons do not get absorbed in the airways and reach the alveoli quickly after aspiration. Hence, they cause an intense inflammatory reaction in the pulmonary parenchyma. They also lead to bronchial oedema, tissue injury, and the loss of surfactants in alveoli. The activation of macrophages and the release of inflammatory cytokines causes these pathologic alterations [10]. All the indicators of macrophage activation can be seen using electron microscopy [11]. Cavitation with parenchymal destruction around large lipid-containing vacuoles has only been observed on rare occasions. Even 1ml of hydrocarbon is thought to be enough to cause lung damage [12]. The host response to inhaled lipid substances varies depending on their chemical properties and manifests as mild to severe illness, occasionally leading to death [13].

Following accidental aspiration of kerosene or diesel when siphoning, the initial presentation can mimic viral pneumonia with fever, cough, and pleuritic chest pain within a few hours, but it can also mimic acute respiratory distress syndrome, which normally occurs after a major exposure [14].

Breathlessness, cough, chest pain, and hemoptysis are common symptoms of hydrocarbon pneumonitis, which might be non-specific. Acute forms normally have a

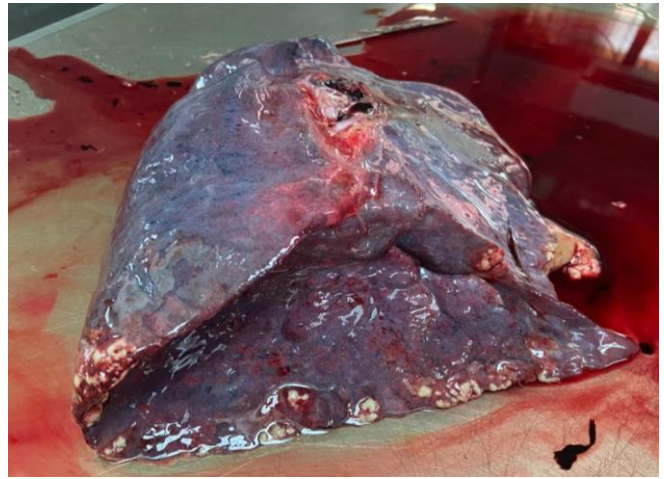


Fig 1. Shows oedematous lung with petechial haemorrhages.



Fig 2. Mucosa of stomach is thick, corrugated, and arranged in longitudinal folds and looking like leather



Fig 3. Shows pericardial effusion with multiple petechial hemorrhages over heart

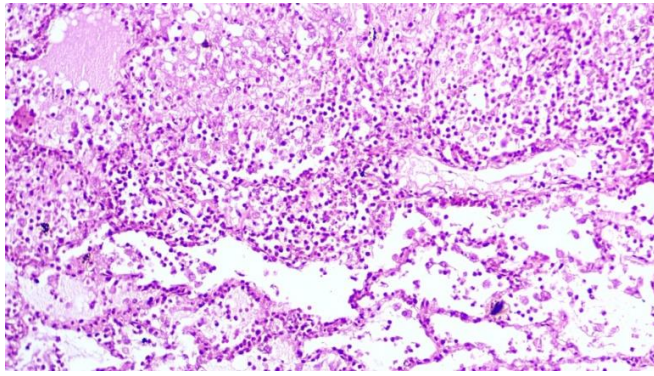


Figure 4. (Histopathology slide) Shows sheets of foamy macrophages admixed with squamous epithelial cells.

favorable prognosis and improve within a few days with conservative supportive therapy; nonetheless, severe cavitary pneumonia and adult respiratory distress syndrome have been reported [15]. For instance, Khanna et al reported a fatal cardiac arrest in a patient, who had bilateral lower zone involvement [1]. Standard textbooks have documented cardiac arrhythmias and cardiomyopathies [16].

Aspiration/inhalation of volatile hydrocarbon compounds with low viscosity and surface tension, which are members of the paraffin, naphthalene, and aromatic classes, can cause hydrocarbon pneumonitis [17]. Because diesel/petrol siphoning is fairly frequent in India, the phenomenon may be more common than reported. While siphoning from gasoline tanks, accidental aspiration of diesel/petrol may occur. When siphoning petrol/diesel, the right middle lobes are frequently impacted [18]. Although the involvement of both lower zones is prevalent radiographically, it is extremely unusual clinically, with only a few anecdotal cases [1]. The autopsy findings in our case revealed lung congestion and foam fluid in the lower right lobe, which were consistent with earlier cases of diesel fuel exposure.

Other system involvement can manifest itself in the form of CNS toxicity, such as weakness, disorientation, and coma. Irritation causes gastrointestinal symptoms such as nausea, vomiting, diarrhea, and esophageal perforation in rare cases. Cardiomyopathy, arrhythmias, and renal toxicity are some of the other symptoms. (19,20) Peri-hilar densities, bronchovascular markings, basilar infiltrates, consolidation mostly affecting the right middle lobe, pneumothorax, pleural effusion, and pneumo-mediastinum are some of the radiological abnormalities found after hydrocarbon aspiration (7,9).

Accidental aspiration of kerosene has also been reported to cause hydrocarbon pneumonitis in professional "fire-eaters" [21]. Bilateral consolidations, which may become cavitated and/or develop pneumatoceles, are the most common radiologic findings [22]. Pulmonary abscess, pneumatocele, pneumothorax, and broncho-pleural fistulae can all be caused by tissue necrosis caused by lipid pneumonia. Scar tissue is usually minor and lesions regress [23, 24]. Leucocytosis, an increase in acute phase reactants, and an increase in liver enzymes are all possibilities [11].

Acute forms normally have a positive prognosis and regress in a few days with conservative supportive treatments. Nevertheless, some cases may have a negative outcome [1].

Poisoning from these compounds is thus a recognized clinical disease, but there is significantly scant research on diesel fuel toxicity than one might expect given its pervasive use. Drinking other hydrocarbons with suicide intent, such as kerosene or gasoline, is also uncommon.

We present a fatal instance of diesel fuel intake caused by accidental diesel aspiration, while siphoning diesel. In this case, *we highlight the fact that mortality* from acute hydrocarbon poisoning could have occurred as a result of accidental diesel aspiration, while siphoning fuel. This is something that clinicians must be aware of because certain cases are fatal, it is critical to get a diagnosis right away.

CONCLUSION

Siphoning diesel from vehicles that have been accidentally aspirated is a popular practice among drivers and mechanics. Diesel aspiration can induce a wide range of symptoms, from a simple cough and fever to severe ARDS and death. It can be acute or chronic, and it can have serious consequences. As a result, manual siphoning should be avoided, and if it must be done, it should be done with caution. Primary prevention necessitates education and safe technique when dealing with manual fuel siphoning. It is critical for the community to intervene to promote knowledge about this disease among mechanics, and the practice of mineral oil siphoning should be discontinued forever. To expedite diagnosis and subsequent management, proper history taking, including occupation and examination should be done. Accurate diagnosis and treatment may improve the prognosis of patients suffering from hydrocarbon pneumonitis as a result of fuel siphonage.

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