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Case Report

Fatal Case of Hydrocarbon Aspiration and Use of Lipoid Cells as Corroborative Finding for Rapid Autopsy Diagnosis in Cases of Delayed Death

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ABSTRACT

Accidental aspiration of diesel can cause consolidation, atelectasis, and abscess formation. Aspiration of diesel usually results into pneumonitis, which resolves completely within 5–7 days of treatment. Diesel aspiration resulting in bilateral pneumonia and death is rare and is scarcely documented in literature. Finding of lipoid cells in lung autopsy specimen is one of the important features of hydrocarbon aspiration. Unfortunately this important finding is not mentioned in most of the toxicology textbooks. Hence, we are reporting this case.

Key words: Aspiration, diesel, hydrocarbon, lipoid cells, pneumonitis

INTRODUCTION

Diesel is one of the byproduct produced by fractionation of crude oil and is commonly used as a vehicle fuel. Aspiration of diesel may occur accidentally while siphoning from fuel tanks, in fire eaters show, etc. Hydrocarbon aspiration leading to fatal outcome is very rare (in the range of 1%).[1] It was in 1897, when first case of hydrocarbon pneumonitis got documented.[2] However, in literature, case reports pertaining to aspiration of diesel during siphonage are sparse. Moreover, standard textbooks of toxicology and forensic pathology give little information regarding hydrocarbon aspiration and autopsy findings. This may be because of low mortality rate in hydrocarbon aspiration and the fact that pathologists usually prefer chromatographic techniques for detection of hydrocarbons. Chromatography techniques are gold standard for detection of volatile poison, but the results are highly dependent on time and method of specimen collection, method of specimen packing, treatment received by deceased and delayed death. A slight change in above conditions increases chances of false-negative results. We noticed an important histological feature of hydrocarbon aspiration, that is, lipoid cells during our routine educational activity.

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CASE REPORT

An 18-year-old male accidentally consumed diesel while siphoning from fuel tank of truck at 3 pm in afternoon. Although he complained of breathlessness, he had not taken any immediate treatment, but after 1 hour he complained of increasing breathlessness and chest pain. For the same he was admitted to the private hospital on same day at 8.20 pm.

On examination, the patient had tachypnea and pulse rate was 117 with blood pressure (BP) of 130/80 mmHg. He was dyspneic at rest. Bilateral wheeze was present. Cough reflex was weak. Chest radiograph showed bilateral mid and lower zone consolidation [Figure 1].

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Diagnosis of accidental diesel poisoning was made. Stomach wash was given. The patient was put on oxygen inhalation, analgesic, and intravenous antibiotics. However, the patient's condition deteriorated and he was kept on ventilator support on 2nd day. Despite all resuscitative measures, the patient succumbed to death after 5 days of treatment.

Postmortem findings

Postmortem examination was conducted on next day in the afternoon. Rigor mortis had developed all over the body. Postmortem staining was present over the back and fixed. Finger nail beds showed bluish discoloration. Intravenous line marks were present on both forearms. No other injuries were seen.

On internal examination, all internal organs were congested. Pleural cavities showed bilateral pleural adhesions and contained 100 ml of straw colored fluid. Both lungs were consolidated. Weight of both lungs was increased with right lung weighing 834 g and left lung 728 g. Surface of heart showed finely distributed petechial hemorrhages [Figure 2]. Stomach contained 20 ml of brown colored fluid with no unusual smell and mucosa hemorrhagic.

Histopathological examination

Histopathological examination of lung tissue showed presence of lipoid cells [Figure 3] with features suggestive of congestion, edema, hemorrhagic necrosis, emphysematous change, and focal features of consolidation.

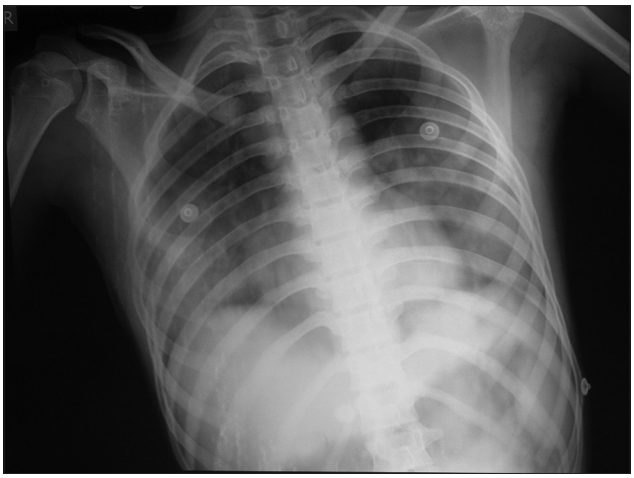


Figure 1: On bed chest radiograph showing bilateral opacities



Figure 2: Heart surface showing petechial hemorrhages

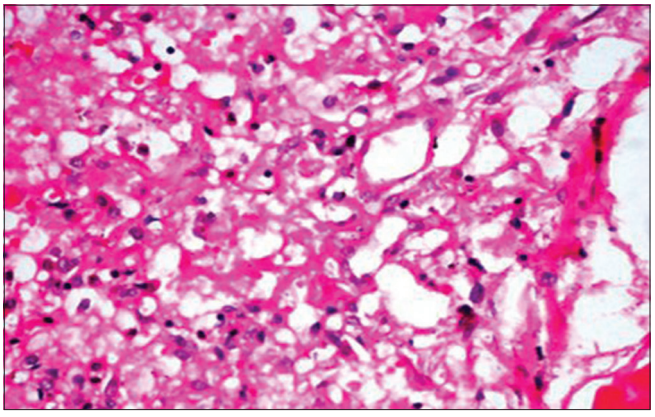


Figure 3: Lung histology showing lipoid cells and infiltrate

DISCUSSION

Hydrocarbons are primarily composed of carbon and hydrogen molecules. They are quite abundant in modern society. From the viewpoint of toxicology, the important features of hydrocarbons are:

- Volatility
- Surface tension
- Viscosity.

Hydrocarbons with low viscosity and high volatility, that is, those of low molecular weight, can be ingested and then spread over mucosal surfaces posing a significant danger of aspiration.

When ingested, hydrocarbons produce several toxic effects; among these, the most serious damage occurs to the pulmonary system. Gummin (2006) in the book Goldfrank's Manual of Toxicologic Emergencies has mentioned that, the mechanism of oil aspiration is the failure of the mineral oil, and similar other substances, to evoke a cough reflex.[3]

The characteristic histopathological picture of hydrocarbon aspiration is the presence of 'lipoid' cells or foamy cells,[4] and this was well demonstrated in this case [Figure 3]. Aspirated oil particles are nonirritating and do not stimulate the cough reflex, and thus reach the lower

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respiratory tract. Once in the airways, they disturb mucociliary clearance and this further impairs their expulsion. The lipids deposited are engulfed by alveolar macrophages.

Radiographic evidence of pneumonitis develops as early as 15 min or as late as 24 h after exposure. Most common pulmonary radiological appearance following siphonage related to diesel aspiration is right middle lobe involvement, it may be due to the forward bending of the patient while siphoning the fuel.[5] In contrast, in the present case, the patient developed bilateral mid and lower zone consolidation. Involvement of right or left lung mainly depends on the host factors (body posture, negative pressure created by mouth while siphoning, etc.), the quantity and nature of the aspirated material, and the frequency of exposure. In the present case apart from the body posture, nature of the aspirated material, that is, diesel (highly volatile with low viscosity) and aspiration of relatively large amount under negative pressure in the mouth are the possible explanation for the bilateral involvement of lungs.

In all cases of hydrocarbon pneumonitis induced by siphonage of diesel that have been reported so far, a favorable clinical outcome has been observed pointing towards low mortality if immediate treatment is initiated.

CONCLUSION

This case highlights the fact that histopathological investigation of 'lipoid cells' can aid in autopsy diagnosis of hydrocarbon aspiration where patients dies after 4–5 days of treatment and chances of getting positive result on chemical analysis are negligible. Although death is rare, treatment should be initiated as early as possible in all symptomatic cases.

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