

# Pneumonia Caused by Diesel Fuel Aspiration

Osman Haciomeroglu, Gulbanu Horzum Ekinci, Esra Akkutuk Ongel, Murat Kavas, Bunyamin Burunsuzoglu, Yasemin Ozel and Adnan Yilmaz

## ABSTRACT

An 18 years old Turkish boy was admitted to hospital due to cough, chest pain and shortness of breath for 4 days. Twenty-four hours before the onset of symptoms, the patient had accidentally aspirated diesel while siphoning from the fuel tank of a car. On admission, he was febrile and tachypnoeic. There were fine crackles on auscultation of the lungs. Chest X-ray revealed bilateral infiltration in the lower lung zones. Arterial blood gas analysis showed pH of 7.42, PaO<sub>2</sub> of 45.6 mmHg, PaCO<sub>2</sub> of 41.3 mmHg and oxygen saturation of 85.2%. He was treated with course of corticosteroid, antibiotic and oxygen supplementation. Chest X-ray showed near-complete resolution 2 weeks after discharge.

**Key Words:** *Lipoid pneumonia. Diesel fuel. Aspiration. Hypoxemia. Hydrocarbon pneumonitis.*

## INTRODUCTION

Lipoid Pneumonia (LP) is an uncommon form of pneumonia resulting from the aspiration or inhalation of fatty substance.<sup>1</sup> This entity was first described by Laughlen in 1925, upon observing the presence of oil in the lungs of four autopsies.<sup>1,2</sup> This condition can be classified as endogenous, exogenous or idiopathic.<sup>3</sup> Most cases of exogenous LP result from occupational exposure in fire-eaters or workers siphoning fuel from tanks. In the case of hydrocarbon pneumonitis after diesel fuel siphonage, the accident usually occurs while the person is bending forward to siphon the fuel.<sup>4</sup> Although LP usually presents as a chronic respiratory disease, it may presents as acute illness. Chronic exogenous LP develops as a result of repeated episodes of aspiration or inhalation of oily substances. It presents as an insidious onset. However, acute disease typically is caused by an episode of aspiration of a large quantity of a petroleum-based product. Acute presentation simulates infectious pneumonia with fever.<sup>5</sup>

We present a case of acute exogenous LP, who had accidentally aspirated fuel while siphoning from the fuel tank of a car.

## CASE REPORT

An 18 years old Turkish boy was admitted to hospital due to cough, chest pain and shortness of breath.

Twenty-four hours before the onset of symptoms, the patient accidentally aspirated diesel while siphoning from the fuel tank of a car. On admission, the patient remained in a relatively good condition, without signs of respiratory failure. On physical examination, he was dyspneic and tachypneic with respiratory rate of 30 breaths/minute. The patient was febrile with temperature of 38°C. He had a heart rate of 78 beats/minute and blood pressure of 110/70 mmHg. There was icterus. Respiratory system examination revealed fine crackles on auscultation of the lungs. Blood investigations showed hemoglobin of 11.8 g/dl, leukocyte counts of 12 x 10<sup>3</sup> cells/μL with 88% neutrophils, and platelet count 170 x 10<sup>3</sup> cells/μL. Blood urea and creatinine were normal. Liver function tests showed high total bilirubin (1.8 mg/dl) and normal SGOT and SGPT levels of 18 and 17 U/L, respectively. He had oxygen saturation (SpO<sub>2</sub>) of 93%. C-reactive protein level was 118 mg/L. Chest X-ray showed bilateral consolidation in the lower lung zones (Figure 1). Computed tomography of the thorax revealed bilateral consolidation in the lower lobes (Figure 2). He was treated with ampicillin/sulbactam (4 x 1000 mg/day, IV), clarithromycin (2 x 500 mg/day, per oral), intravenous methyl prednisolone (1 x 40 mg/day) and oxygen supplementation.

The patient was referred to this hospital 4 days after hospitalization because of general poor health. On admission, the patient was dyspneic. He had respiratory rate of 20 breaths/minute; temperature of 36.7°C; heart rate of 82 beats/minute; blood pressure of 115/70 mmHg. There was no icterus and cyanosis. Respiratory system examination revealed fine crackles on auscultation of the lungs. Posterior-anterior chest X-ray showed bilateral consolidation in the lower lung zones. Blood analysis revealed hemoglobin of 14 g/dl, leukocyte counts of 6.5 x 10<sup>3</sup> cells/μL with neutrophils of 91.2%, and platelet count 140 x 10<sup>3</sup> cells/μL. Liver function tests showed high total bilirubin (2.26 mg/dl) and high

*Department of Pulmonology, Sureyyapasa Center for Chest Diseases and Thoracic Surgery Training and Investigation Hospital, Istanbul, Turkey.*

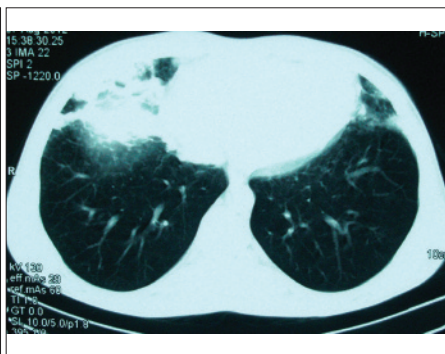
*Correspondence: Dr. Gulbanu Horzum Ekinci, Department of Pulmonology, Sureyyapasa Center for Chest Diseases and Thoracic Surgery Training and Investigation Hospital, Maltepe, Istanbul, Turkey.*

*E-mail: gulbanuh@hotmail.com*

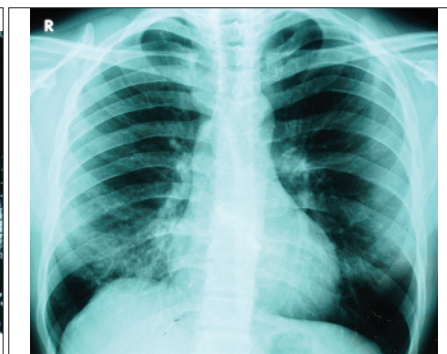
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**Figure 1:** Chest X-ray showed bilateral consolidation in the lower lung zones.



**Figure 2:** Computed tomography of the thorax shows bilateral consolidation in the lower lobes.



**Figure 3:** Chest X-ray shows near-complete resolution 2 weeks after discharge.

SGOT and SGPT levels of 120 and 48 U/L, respectively. C-reactive protein level was 9.8 mg/L. Arterial blood gas analysis showed pH of 7.42, PaO<sub>2</sub> of 45.6 mmHg, PaCO<sub>2</sub> of 41.3 mmHg and oxygen saturation of 85.2% on room air. The patient was referred to respiratory intensive care unit. He was treated with intravenous ciprofloxacin (2 x 400 mg/day), intravenous methyl prednisolone (2 x 40 mg/day) and oxygen supplementation for 3 days. Arterial blood gas analysis revealed pH of 7.51, PaO<sub>2</sub> of 90 mm of Hg, PaCO<sub>2</sub> of 34.9 mm of Hg and oxygen saturation of 98%. Later, the patient was referred to chest clinic. Fiberoptic bronchoscopy was performed. It was unremarkable. The treatment was continued for 9 days. Chest X-ray showed near-complete resolution 2 weeks after discharge (Figure 3).

## DISCUSSION

Lipoid pneumonia, also known as lipid pneumonia, oil pneumonia, oil aspiration pneumonia, pulmonary steatosis, lipid cell pneumonia, pulmonary lipidosis or paraffin pneumonia, is a chronic inflammation of the lung parenchyma with interstitial involvement caused by the accumulation of oily material in the alveoli.<sup>2</sup> Although the precise clinical incidence of LP is unknown, a frequency of only 1.0 - 2.5% was found in autopsy studies.<sup>5</sup> This condition can be classified idiopathic, endogenous or exogenous due to the source of the lipid. Idiopathic group is associated with smoking in healthy persons. Endogenous LP, also called cholesterol pneumonitis or golden pneumonia, is less frequent and occurs due to the distal obstruction of the airways by tumors, bronchiolitis obliterans, suppurative processes and lipid storage diseases. Exogenous LP is caused by the aspiration or inhalation of animal, mineral or vegetable oils.<sup>2-6</sup> Most cases of exogenous LP result from occupational exposure in fire-eaters or workers siphoning fuel from tanks.<sup>4,7-9</sup> This patient accidentally aspirated diesel while siphoning from the fuel tank of a car. Siphoning of diesel from the tanks is a common practice in Turkey and may be an important risk factor of LP.

Lipoid pneumonia has been reported in all age groups.<sup>1</sup> The clinical picture can vary significantly among individuals, ranging from asymptomatic to severe, life-threatening disease.<sup>2</sup> The usual presentation is an insidious onset of dyspnea and/or cough, similar to those of many other chronic lung diseases. Acute LP typically manifests clinically as cough, dyspnea and fever. It can simulate infective pneumonia and can result in respiratory failure.<sup>2,9,10</sup> Acute presentation usually results from an episode of aspiration of a large quantity of a petroleum-based product.<sup>5</sup> The central nervous system, the gastrointestinal tract and the lungs are most commonly involved in the cases of lipoid pneumonia caused by diesel fuel aspiration.<sup>7</sup> This patient presented with acute respiratory distress and fever, shortness of breath, tachypnea and hypoxemia. He only had respiratory system symptoms. Twenty-four hours before the onset of symptoms, he had accidentally aspirated diesel while siphoning from the fuel tank of a car. Acute lipoid pneumonia can manifest radiologically within 30 minutes of episode of aspiration or inhalation, and pulmonary opacities can be seen in most patients within 24 hours. The most common site of involvement owing to leaning forward position of the siphoners is the middle and lower lobes. The opacities are typically consolidative or ground-glass, bilateral, and segmental or lobar distribution. Poorly marginated nodules, pneumatoceles and pleural lesions are other manifestations of acute lipoid pneumonia. Computed tomography can reveal areas of fat attenuation as low as -30 HU within the consolidative opacities and nodules.<sup>4,5,7</sup> In this patient, chest X-ray and computed tomography of the thorax showed bilateral consolidation with air bronchogram in basal lung.

The treatment of this disorder is not well-defined and experience with treatment is only based on case reports. Avoiding ongoing exposure and providing supportive care is the mainstay of treatment.<sup>1,10</sup> Most cases will resolve spontaneously with cessation of exposure.<sup>6,9</sup> Systemic corticosteroids have been used to slow the inflammatory response but are supported only by anecdotal reports. Corticosteroids may be used if the lung injury is severe and ongoing.<sup>1,10</sup> Empirical antibiotic

therapy is used for infections that complicate local inflammatory response. Cases that are associated with respiratory failure require adequate treatment according to generally accepted rules.<sup>9</sup> Bronchoalveolar lavage, immunoglobulins and surgery are other treatment modalities.<sup>1,9</sup> Therapy is usually followed by clinical improvement and complete or nearly complete remission of radiological signs during the next 1 - 12 months.<sup>9</sup> The disease may be progressive. It may be complicated by superinfection by several microorganisms. Other complications include respiratory insufficiency, cor pulmonale and fatality.<sup>1</sup> This patient was treated with antibiotic, corticosteroid and oxygen supplementation. He had complete clinical and nearly complete radiological improvement 2 weeks after discharge from hospital.

In conclusion, lipoid pneumonia is a rare condition. The accidental diesel aspiration while siphoning is a common reason for exogenous lipoid pneumonia. Early diagnosis and proper treatment are the most important factors to reduce morbidity and mortality.

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