Lipoid Pneumonia: A Preventable Complication

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Abstract

Background: Lipoid pneumonia is a pneumonitis resulting from the aspiration of lipids, and is commonly associated with the use of mineral oil as a laxative. LP is relatively unfamiliar to clinicians and is probably underdiagnosed.

Objectives: To increase physicians' awareness of LP, its diagnosis and prevention.

Methods: We present two illustrative cases of LP and review the literature.

Results: Two cases of LP were diagnosed within half a year in an internal medicine ward. Both cases were elderly patients, and LP was associated with the use of mineral oil as a laxative agent. Computerized tomography revealed bilateral low attenuation infiltrates, associated with a "crazy paving" pattern in one case. Sudan Black staining was diagnostic in both cases – in one on a transbronchial biopsy specimen, and in the other on sputum cytologic examination. Both patients suffered from neurologic diseases and were at risk of aspiration. In both cases clinical symptoms and signs continued for several months prior to diagnosis but resolved after the mineral oil was discontinued.

Conclusions: LP often occurs in elderly patients who are at risk of aspiration. The condition may be underdiagnosed. Since in most cases mineral oil cathartics are the causative agent, an effort at primary prevention is indicated. It is suggested that the licensing of mineral oil for internal use be changed.

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Elderly patients are often exposed to multiple pharmacological agents and are therefore prone to suffer from the adverse effects of medications. Lipoid pneumonia is a pneumonitis resulting from the aspiration of lipids. We present two cases of lipoid pneumonia in elderly patients, associated with the use of mineral oil as a laxative agent, and highlight the problems associated with establishing the diagnosis.

Patient Descriptions

Patient 1

A 77 year old man was admitted to hospital because of fever for 2 days. Ten months earlier he suffered a cerebral stroke, and since then oral mineral oil as a laxative agent was added to his other medications. Physical examination on admission showed right lung rales and a chest X-ray revealed a left lung infiltrate. The patient was treated empirically for suspected bacterial pneumonia with antibiotics and discharged. Four and a half months later he was readmitted to hospital because of fever, cough and right chest pain of a few days duration. Physical examination showed bilateral decreased respiratory sounds and rales. Chest X-ray showed bilateral infiltrates. A computed tomography scan of the chest showed a pulmonary infiltrate with air bronchogram in the right middle lobe, bilateral lower lobe ground-glass opacities with thickening of interlobular septa (a "crazy paving" pattern), and a circumscribed mass in the left lower lobe [Figure 1]. Sputum culture was unremarkable, and Sudan Black staining was negative. The patient underwent bronchoscopy with biopsies as well as bronchoalveolar lavage, which was negative for microorganisms. Biopsy specimens showed numerous clear droplets in the lung parenchyma and intra-alveolar and interstitial macrophages with vacuolated cytoplasm. A diagnosis of exogenous lipid pneumonia was established, and the patient was instructed to avoid any consumption of mineral oil cathartics in the future. Most of his symptoms resolved within 2 weeks of admission. Later follow-up was uneventful,

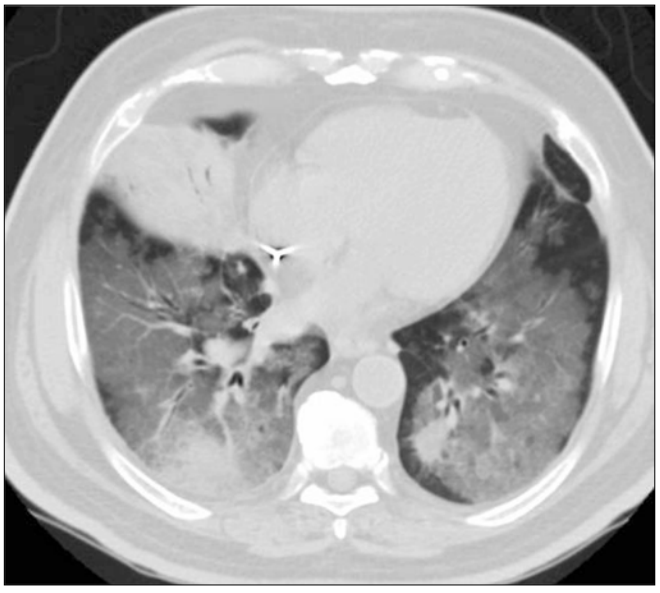

Figure 1. Chest CT scan in patient 1, showing diffuse ground-glass opacities with thickening of interlobular septa in lower lobes ("crazy paving"), airspace consolidation in the right middle lobe, and circumscribed peripheral mass in the left lower lobe (paraffinoma).

LP = lipoid pneumonia

until the patient succumbed to a fatal intracerebral hemorrhage 6 months later.

Patient 2

An 81 year old man with a history of senile dementia and parkinsonism was admitted to hospital due to a fever of 3 days without localizing symptoms. His medications included mineral oil as a laxative that was administered for an undetermined period. Physical examination revealed bilateral early inspiratory rales, and a chest X-ray showed increased lung markings in the lower fields. The patient was treated with empiric antibiotic therapy for a presumed pneumonia, and discharged. A week later he was admitted because of continuing fever and cough. A review of his medical records showed that 4 months earlier similar respiratory findings were found on a previous hospitalization due to bradycardia. At this point the possibility of lipoid pneumonia was raised. Mineral oil was discontinued. A CT scan of the chest revealed bilateral infiltrates in the posterior portions of the lower lobes. The infiltrates were hypodense, with a density of fat [Figure 2]. Due to the patient's frail condition a bronchoscopy was considered high risk. An induced sputum sample, however, revealed multiple alveolar macrophages that were laden with small vacuoles and stained positive for fat on Sudan Black staining. A diagnosis of exogenous lipoid pneumonia was established. The patient's fever and cough resolved spontaneously and he was discharged with the recommendation to avoid any further consumption of mineral oil.

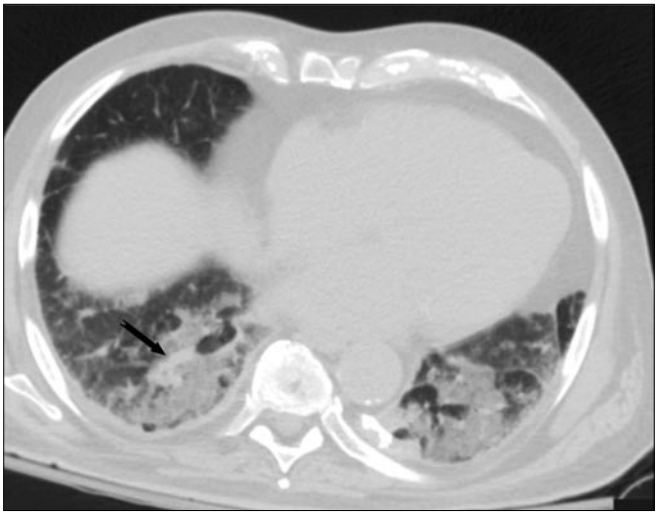

Figure 2. Chest CT scan in patient 2 showing: bilateral infiltrates associated with dependent lung regions (declivity), and low density infiltrates with fat attenuation on CT that were hypodense when compared to traversing vessel (positive angiogram sign is indicated by an arrow)

Discussion

Lipoid pneumonia is the result of a foreign body-type reaction to the presence of lipid material within the lung parenchyma. LP can be caused by the deposition of endogenous lipid material (endogenous lipid pneumonia) – mostly necrotic cells in the setting of an occluding bronchial neoplasm, or by the aspiration or inhalation of exogenous lipids (exogenous lipid pneumonia). This syndrome was first described by Laughlen in 1925 [1], who also elucidated the relationship between lipid aspiration and LP in an animal model.

There is wide geographic variation in the prevalence of lipids associated with exogenous LP. In some African and Middle Eastern countries, LP is often a pediatric condition associated with the forced feeding of babies with clarified butter (ghee) [2] or the nasal instillation of olive oil [3]. In Far Eastern countries, another often reported cause is the medicinal use of squalene, present in shark liver oil [4].

In industrialized nations many different agents are associated with LP. Among these are oily foods (e.g., ketogenic diet-associated LP) [5], the ingestion and aspiration of kerosene [6], and vaporized lipids inhaled during metal processing. However, the more frequent cause for LP is the medicinal use of mineral oil (paraffin) – usually as a laxative agent [7,8].

Mineral oil is a mixture of liquid-saturated hydrocarbons obtained from petroleum. When administered orally, it is only negligibly absorbed, and its common side effects are rectal seepage and irritation. However, when mineral oil is regurgitated and aspirated, LP will ensue.

The exact incidence of LP is unknown. Data from past autopsy series have suggested an incidence of about 1–2.5% [9]. Yet, clinically diagnosed LP appears to be rare. In France, a survey of all medical departments during the period 1981 to 1993 revealed only 44 cases of LP [7]. This would represent a prevalence of less that $1/10^7$ inhabitants. However, in studies targeting at-risk populations the incidence of LP may actually be much higher: in a cohort of 389 chronically (mainly neurologically) ill patients, an active search yielded evidence for LP in 14.6% [9]. In all probability, the explanation for this discrepancy of about 5 orders of magnitude is a lack of physician awareness of the condition, with only the most atypical cases being diagnosed – often adventitiously during the search of other diagnoses. LP may resolve spontaneously, and since most cases of infectious pneumonitis are treated empirically LP may be confused with the latter diagnosis.

Several studies have assessed the radiologic patterns associated with LP. On CT one of several patterns may emerge, which although not pathognomonic, may aid the clinician to differentiate LP from infectious pneumonitis. In most cases the disease tends to be bilateral, with a predilection for the lower lobes and dependent regions of the lungs (declivity) [7,10]. LP is commonly seen as patchy ground-glass attenuation with superimposed septal thickening (crazy-paving pattern) [7,11], or as low attenuation infiltrates with a "positive CT angiogram sign" [12].

The natural history and outcome of LP are variable. This and the low number of cases make it difficult to establish the optimal treatment. The first and foremost concern is the avoidance of further insult. The mechanical lavage of the lipid from the lung through segmental bronchoalveolar lavage has been attempted, but is probably of value only in acute and massive

aspiration [13]. In many cases, by the time pneumonitis develops, much of the lipid will already have been translocated into interstitial macrophages and cannot be mechanically removed. The addition of corticosteroids was first attempted in 1965. Their value has never been clearly established. Since many cases of LP appear to be mild and are universally non-progressive if further insult is avoided [7], corticosteroids should probably be reserved for severe cases.

Since the majority of cases of LP in western countries appear to be iatrogenic, primary prevention should be stressed. Mineral oil should not be administered to patients who are at risk of aspiration. These include children and elderly patients with neurologic disease, dysphagia due to any reason, gastroparesis and significant gastroesophageal reflux. Mineral oil should never be ingested prior to recumbency and sleep. Since the appearance of LP may be very insidious, mineral oil should probably be discontinued in the above cases, even if they are asymptomatic.

Mineral oil laxatives are marketed widely without prescription. Their use may be extensive but there are no national data regarding their consumption. In our institution the yearly consumption of mineral oil varies from less than 10 L in most medical wards to more than 100 L in some geriatric wards. In Israel, mineral oil use is completely unregulated since it is licensed as a food additive. Therefore, no information is provided for consumers or clinicians on possible hazards, the need for caution in some populations or on the proper mode of use. It is suggested that increased physician awareness and changes in the licensing of mineral oil for internal use can contribute significantly to the primary prevention of LP.

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