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Original Research Article

Exogenous Lipoid Pneumonia Diagnosed on Paediatric Autopsy Examination – A Case Series

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Abstract

Background: Lipoid pneumonia is caused due to deposition of foreign body of lipid nature within the lung parenchyma which may enter directly through upper respiratory tract or it may be secreted distal to the obstruction in terminal bronchioles. In this case series, we aim to shed light over this rare and underdiagnosed cause of pneumonia which is often missed on clinical examination as well as on autopsy. **Methods:** The information provided through Inquest report was analyzed. During autopsy tissues for histopathology were preserved. Histopathological examination of lung parenchyma was carried out to examine the features consistent with lipoid pneumonia. **Results:** Cytological demonstration of lipid-laden macrophages and histopathological examination showing bacterial colonies and lipid molecules in lung parenchyma is consistent with diagnosis of exogenous Lipoid pneumonia in the studied cases. **Conclusion:** A vast majority of Lipoid Pneumonia cases remain undiagnosed as Histopathological analysis is not done. We would like to comment that there are certain events which leads to the deposition of lipids in lung parenchyma thereby leading to the development of 'lipoid pneumonia' highlighting the importance of histopathological examination in cases with such histories.

1. Introduction

Lipid pneumonia is caused due to deposition of foreign body of lipid nature within the lung parenchyma which may enter directly through upper respiratory tract or it may be secreted distal to the obstruction in terminal bronchioles. Lipoid pneumonia is a specific form of lung inflammation (pneumonia) that develops when lipids enter the bronchial tree. The disorder is sometimes called cholesterol pneumonia in cases where that lipid is a factor.¹ Lipid pneumonia has been known to occur in underwater divers after breathing poorly filtered

air supplied by a surface compressor lubricated by mineral oil.² One of the earliest articles published on this condition was based on autopsy findings in Canadian children who developed pneumonia following nasopharyngeal injections of oil in hospital.³

The use of various folk treatments including the administration of these oils orally or by nose in children, as well as associated cultural behaviours, have also been described in the literature on exogenous lipoid pneumonia, which is linked to the

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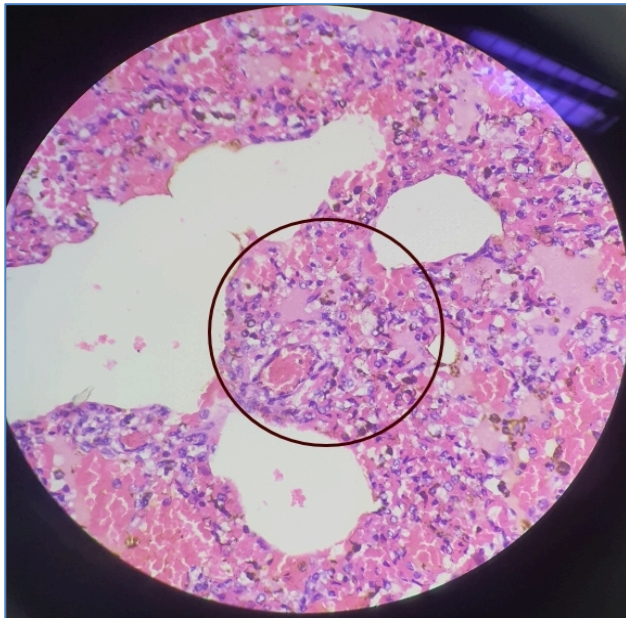
medical use of oil-based products in children.^{4,5,6} The cases of Exogenous Lipid pneumonia can be further complicated by Mycobacterium infection with expected high mortality.

2. Case presentation

2.1 Case 1:

History- The deceased, 42 days old male child, was sleeping besides his mother at home at 11.30 pm. At 2.00 am, the mother woke up to breastfeed her child but found the child unconscious with blood oozing out of his nose. The parents brought him to the hospital, where he was declared 'brought dead'.

Figure 1: RBCs In Interstitium Suggestive Of Haemorrhages



Histopathology- Thickened pleura with focal haemorrhages. Alveoli and bronchioles show haemorrhages and oily proteinaceous fluid with macrophages scattering of inflammation seen [Figure 1].

2.2 Case 2:

History- 15 days male with history of breastfeeding at 4:00 AM and at 7:00 AM, he was found in an unconscious state with blood oozing out of nose.

Histopathology- The pleura shows areas of haemorrhages. Diffuse intra-pulmonary haemorrhages seen. Patchy areas of alveoli show oedema. Interstitium is oedematous with congested and dilated blood vessels. Bronchioles are unremarkable. Blood vessels are thick walled and congested [Figure 2, Figure 3].

2.3 Case 3:

History- The said deceased 7 days female was found in unresponsive condition in the morning. She was

brought to the Hospital Casualty where she was declared 'brought dead' on the same day.

Histopathology- Diffuse Alveolar deposits of translucent, irregular shaped, acellular, strips to flat plates of unknown aspirated foreign material, septal and alveolar tissue present. No evidence of inflammatory exudate [Figure 4].

Figure 2: Fat Globules

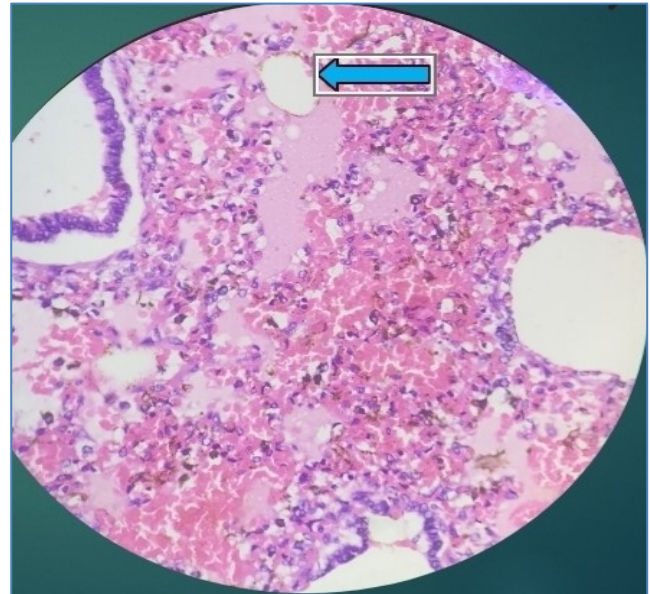
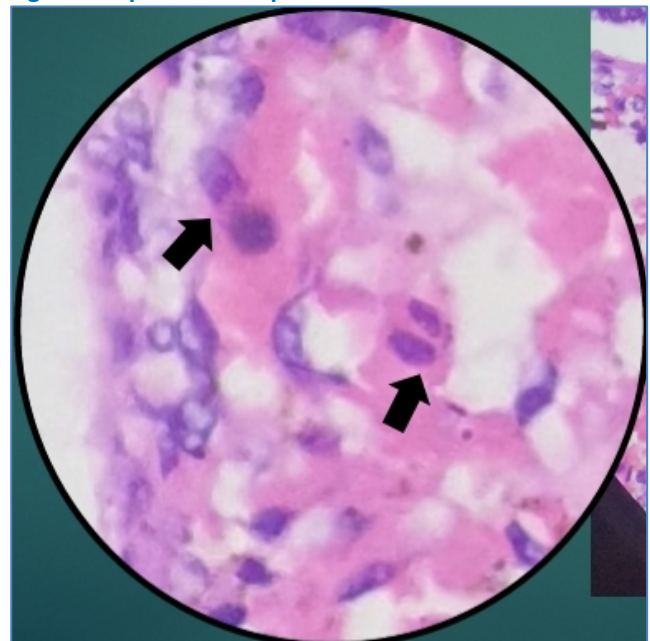


Figure 3: Lipid In Eosinophils



2.4 Case 4:

History- The said deceased, 2 years old male, while playing at his home, drank some petroleum oil thinking it was drinking water. He was declared 'Brought Dead' when presented to casualty.

Histopathology- Bronchioles and alveoli show oil droplets with eosinophilic material in air

spaces with mild to moderate inflammatory infiltrate in alveoli and interstitium. Focally the air spaces are lined by eosinophilic hyaline membranous material [Figure 5, Figure 6].

Figure 4: Acellular Eosinophilic Material

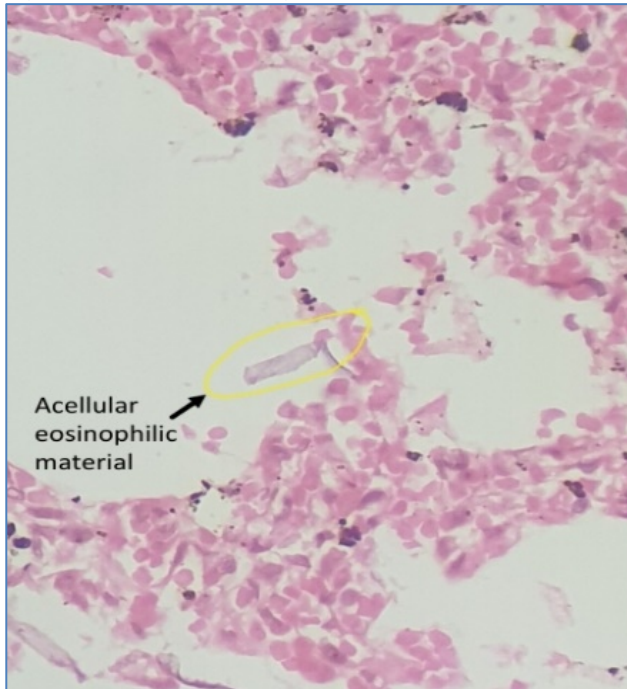
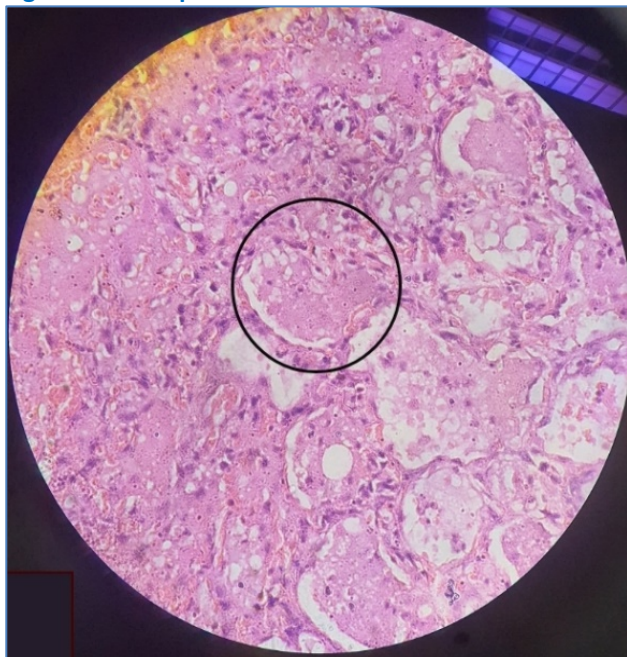


Figure 5: Eosinophilic Infiltration



Case 5

History-The said deceased, was a 13 days/ female child, was breastfed by her mother at 7:00 AM. At 9:00 AM, when father of the deceased arrived at home, found the child not moving. He hence brought him to the casualty, where on examination, was declared brought dead at 10:00 AM.

Figure 6: Hyaline Membrane

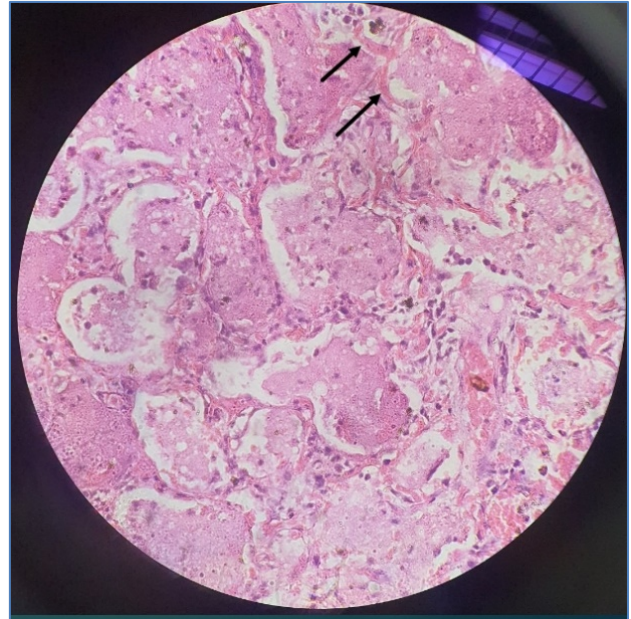


Figure 7: Neutrophilic abscess in bronchiole

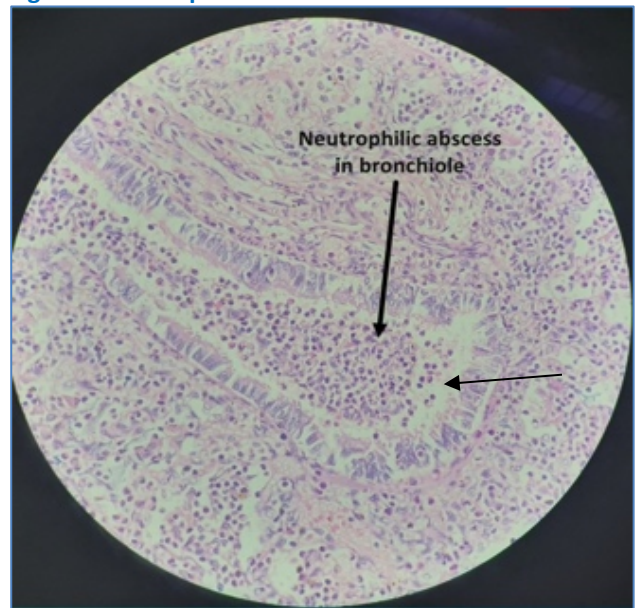
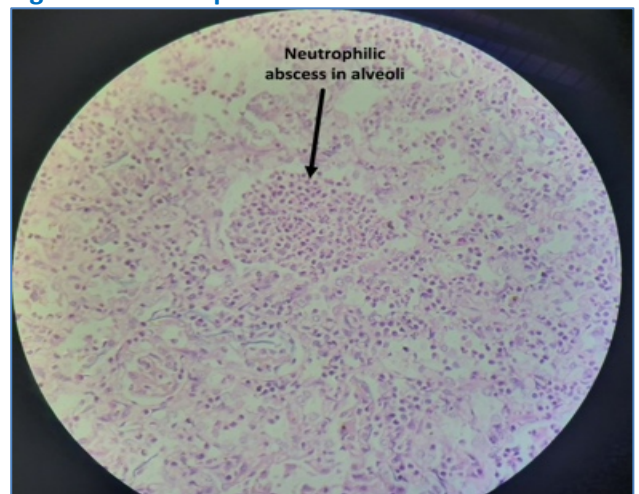


Figure 8: Neutrophilic Abscess In alveoli



Histopathology -Pleura unremarkable. Alveoli show dense mixed inflammatory infiltrate comprising of neutrophils with few lymphocytes suggestive of bronchopneumonia. Also seen are bacterial colonies within the bronchioles and foreign material within the alveoli, suggestive of aspiration. Focal intra-alveolar haemorrhage present, blood vessels congested [Figure 7, Figure 8].

3. Discussion

All the subjects were in age group ranging from 7 days to 2 years. Four of them had a history of being breast fed and 1 case included accidental ingestion of petroleum product. The conclusive results of the above cases were based on the observations of autopsy and histopathological examinations. On gross examination lungs were firm to rubbery in consistency and cut-section showed red hepatization. Histopathology study showed Fatty substance (fat globules)/ Foreign Particles, Eosinophilic infiltration, Eosinophils with lipid molecules, Hyalinization (thickening) of basement membrane and Bacterial Colonization noted. The above-mentioned observations were consistent with the diagnosis of exogenous lipid pneumonia in the above-mentioned cases. The condition of exogenous lipid pneumonia is complicated due to its non-specific and unclear ante mortem course, presentation and imaging pattern. In ante-mortem cases bronchoalveolar lavage is the most common mode of cytology sampling, and a biopsy or another modality is pursued for confirmation.⁷

While lipid pneumonias can be exogenous, they can present as endogenous when a pneumonia is developed beyond an obstruction or accumulation of lipid-containing macrophages distal to an area of obstruction, infection, or lipid storage disease. While most reported cases of exogenous lipid pneumonias are acute, there have been cases of chronic lipid pneumonias in ante-mortem cases. Complications of lipid pneumonia include the development of fibrotic component in chronic cases. Other possible complications include superinfection by non-tuberculous mycobacteria, respiratory insufficiency, cor pulmonale and hypercalcemia. The diagnosis of exogenous lipid pneumonia is based on a history of exposure to oil with radiological findings in consistent with the disease and the presence of lipid-laden macrophages on sputum. It should be considered, however, that none of these findings alone is diagnostic of lipid pneumonia.^{8,9,10}

Histopathologically, chronic exogenous lipid

pneumonia is characterized by the presence of lipid-laden macrophages that fill and distend the alveoli and interstitium, where they may be associated with accumulation of lipid material, inflammatory cellular infiltration, and variable amount of fibrosis. Alveolar hemorrhage and inflammatory exudate may be present.^{8,9,10,11} Local custom of giving oil baths to infants and of cleansing the mouth, throat, and nose with oil is a common practice in many communities. (Caffey,1967). Adams (1967) warned that substances such as cod liver-oil, castor oil, and mineral oil are easily aspirated even when carefully administered. In all such cases, aspirational pneumonia is one of the commonest causes of death.¹² Most Lipid Pneumonia cases remain undiagnosed as HP analysis is not done and COD is directly given as "Pneumonia" due to similar gross macroscopic findings.^{8,9,10} Multiple studies suggest a link between exposure to lipid-based particles and development of Pneumonia at a later stage in life which can be acute or chronic.^{8,9,10,12} Eosinophilic infiltration with lipid laden eosinophils¹³ can be found in histopathological studies in cases of sudden death due to pneumonia following lipid ingestion. In a study of Karim et al, on 107 children with pulmonary aspiration, the most frequent causes of pulmonary aspiration were caused by milk (31.8%) and oral secretions (19.6%).¹⁴

4. Conclusion

To distinguish between pneumonia and lipid pneumonia, babies and kids who die suddenly after breastfeeding or consuming oil-based materials should have their bodies checked for the presence of fat globules, lipid-laden eosinophils, or eosinophilic infiltration. A history of oil exposure, distinctive radiological abnormalities, and the presence of lipid-laden macrophages on sputum or BAL analysis are the main factors used to diagnose exogenous lipid pneumonia. Only a small percentage of individuals with chronic ELP get well even after the causing exposure has been identified and stopped, and the disease's progression may be linked to recurrent aspiration or regurgitation. Aggressive risk-factor management, which includes lifestyle adjustments (such as raising the head of the bed and avoiding late-night meals), may therefore be beneficial for these individuals.

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Ethical Clearance: Yes.

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