

Severe Lipoid Pneumonia Following Aspiration of Machine Oil: Successful Treatment with Steroids

Indumathi CK, Vikram Kumar S, Prima Paul and Sanjiv Lewin

Department of Pediatrics, St. John's Medical College Hospital, Bangalore, India

ABSTRACT

Lipoid pneumonia in children follows mineral oil aspiration and may result in acute respiratory failure. Majority of the patients recover without long-term morbidity, though a few may be left with residual damage to the lungs. We report a case of a two-and-a-half-year-old child with persistent lipoid pneumonia following accidental inhalation of machine oil, who was successfully treated with steroids. [Indian J Chest Dis Allied Sci 2012;54:197-199]

Key words: Machine oil, Lipoid pneumonia, Steroid.

INTRODUCTION

Lipoid pneumonia is a chronic inflammation of the lung parenchyma with interstitial involvement due to accumulation of oily material in the alveoli. Chronic mineral oil administration for constipation and nasal instillation of olive oil to relieve nasal congestion are common causes of lipoid pneumonia worldwide. Here, we report a case of a two-and-a-half-year-old child presenting with severe lipoid pneumonia following accidental ingestion of machine oil, who was successfully treated with prednisolone.

CASE REPORT

A two-and-a-half-year-old girl child was brought with a history of rapid breathing and lower chest retractions since two months. The symptoms started following accidental ingestion and aspiration of machine oil, that was stored in a water bottle. The child developed choking and cough immediately following ingestion of oil. After six to eight hours, she developed tachypnoea and was admitted to a local hospital. Chest radiographs revealed bilateral opacities in both mid and lower lung zones. She received antibiotics, oxygen and intravenous fluids and discharged after two weeks. However, she continued to have cough, fast breathing and chest retractions and was then referred to our hospital. Respiratory distress increased with physical activity. There was no history of fever or seizures. She was immunised to date.

On examination, the child was active, alert and weighed 13Kg. She was tachypnoeic, breathing at a rate of 80 per minute, heart rate was 100 per minute and blood pressure was 100/60 mmHg. There were mild subcostal retractions, grade 1 clubbing and cyanosis. There were fine inspiratory crackles in the infrascapular areas. Examination of the cardiovascular and neurological systems was within normal limits. Per abdominal examination revealed enlargement of liver of 2 cm.

Laboratory investigations revealed haemoglobin 10 g/dL, total leukocyte count 4500 /mm³ with a differential count of polymorphs 60%, lymphocytes 35% and eosinophils 5%. Arterial blood gas analysis showed pH 7.37, PCO₂ 45 mmHg, PaO₂ 80 mmHg, HCO₃ 20 meq/L with an oxygen saturation of 85 percent. Chest radiograph (postero-anterior view) revealed bilateral homogeneous opacities in the mid and lower lung zones (Figure 1). There was no cardiomegaly. Echocardiography was non-contributory. High resolution computed tomography of the chest revealed bilateral extensive consolidations with ground-glass opacities suggestive of diffuse alveolar damage (Figure 2).

The child was given oxygen by face mask, with two litres of oxygen per minute, she maintained a saturation above 90 percent. However, there was no improvement in the respiratory distress and respiratory rate remained above 70 per minute with retractions. Oral prednisolone (2 mg/kg/day) was added on day four of admission and she was discharged on home oxygen after one week. The child was followed up periodically in the out-patient

[Received: August 23, 2011; accepted after revision: April 23, 2012]

Correspondence and reprint requests: Dr Indumathi CK, Associate Professor, Department of Pediatrics, St. John's Medical College Hospital, Sarjapur Road, Bangalore-560 034 (Karnataka) India; Phone: 91-80-2206 5284; Fax: 91-80- 2553 0070; E-mail: ckindumathi@gmail.com

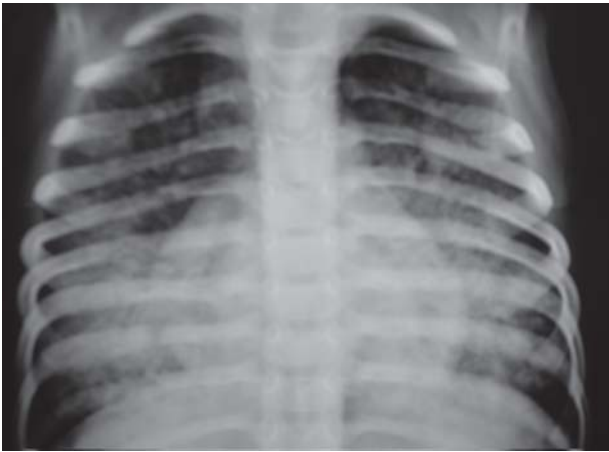


Figure 1. Chest radiograph (postero-anterior view) showing bilateral opacities in the mid and lower lung zones.



Figure 2. High resolution computed tomography of the chest showing bilateral extensive consolidation.

department. After eight weeks of steroid therapy, tachypnoea and oxygen requirements gradually decreased. Steroids were gradually tapered and stopped over the next 10 weeks. At the end of five months, the respiratory rate was 40 per minute and she was able to maintain an oxygen saturation above 95% on room air. Repeat chest radiograph showed clearing of opacities except for small patches in the right and left mid lung zones (Figure 3).

DISCUSSION

A lipoid pneumonia is a chronic interstitial proliferative inflammation resulting from aspiration of lipid material. This usually follows accidental aspiration of mineral oil (liquid paraffin) administration to relieve chronic constipation in children and adults.¹⁻⁴ Machine oil, which is used as lubricant in industries, is a mixture of refined mineral oil, aliphatic hydrocarbons and anti-rust compounds. Nasal or oral instillation of vegetable oil during bathing of healthy infants is a traditional practice in

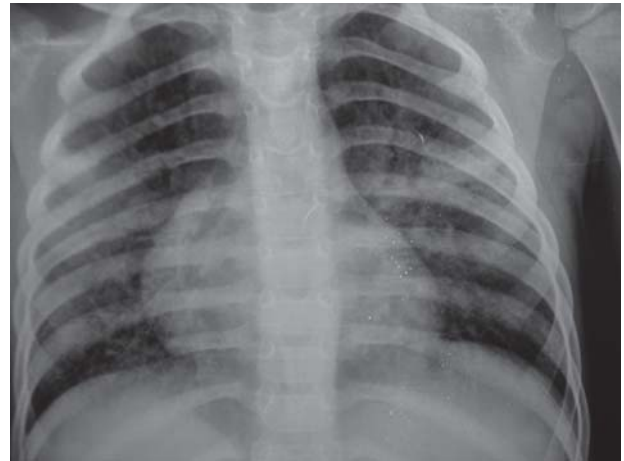


Figure 3. Post-treatment chest radiograph (postero-anterior view) showing resolution of opacities after five months.

southern India.⁵ Similarly olive oil instillation to relieve nasal congestion is practised in Saudi Arabia.⁶ In a study by Mahadevan *et al*,⁵ lipoid pneumonia secondary to nasal or oral instillation of oil accounted for 18% of lower respiratory tract infections. Annobil *et al*⁶ have reported five cases of severe lipoid pneumonia following chronic nasal instillation of olive oil in children. Children with neuro developmental delays, gastro-oesophageal reflux, cleft palate and swallowing dysfunction are more prone to aspirate oil. Nasal instillation and forced oral administration in a supine position predispose to aspiration.

Majority of children with lipoid pneumonia recover. However, in a few instances, the oil leads to a severe inflammatory response, chronic alveolar and interstitial inflammation, fibrosis, cor-pulmonale and chronic respiratory failure.^{2,4,6} In a multi-centre retrospective study² conducted in adults, 21% of patients with aspiration of oil developed interstitial fibrosis and recurrent infections. Clinical findings of lipoid pneumonia include persistent cough, progressive dyspnoea, clubbing, recurrent infections and unresolving radiological features of pneumonia.^{2,4} The HRCT reveals bilateral, extensive alveolar consolidations, ground-glass appearance and crazy-paving pattern.^{2,4}

The diagnosis of lipoid pneumonia is usually easy when a history of aspiration is available as in the present case. However, many cases of chronic ingestion and nasal instillation of oil mimic other pulmonary conditions and will present with unresolved pneumonia not responding to antibiotics. Secondary bacterial infection is common and atypical bacterial infection may be the presenting symptom.^{4,6} A high index of clinical suspicion of lipoid pneumonia is essential in such cases and the diagnosis can be confirmed by demonstrating lipid laden macrophages in broncho-alveolar lavage⁴ or open lung biopsy. Histological

changes consist of inflammatory reaction and fibrosis.²

Several modalities of treatment have been tried to prevent or halt the progress of damage in lipoid pneumonia, but there is no consensus on the right treatment. Steroid therapy is one of the modalities that has been used by several clinicians.^{2,6-8} It limits the inflammatory response and ongoing fibrosis. Annobil *et al*⁶ reported a series of five children aged between four months to four years with lipoid pneumonia following nasal instillation of olive oil, where prednisolone was used for a varying periods of two months to five months resulting in complete clinical and radiological recovery. Similarly steroids were used in adults with lipoid pneumonia leading to a complete recovery.^{7,8} Our case showed clinical improvement after eight weeks of therapy and showed almost complete radiological clearance in five months. Multiple bronchoalveolar lavages, either alone or in combination with steroids, have been tried in resistant cases.^{2,4,9} Sequelae include reduced lung function, both restrictive and obstructive.² Abnormal lungs function tests may take several months to resolve and all affected patients should undergo lung function tests periodically. However, lung function tests could not be done in our child as she was too young.

Preventive measures to avoid accidental inhalation of oils by children and parental education about indiscriminate use of mineral oils cannot be over emphasised here as lipoid pneumonia is totally preventable. Steroid therapy can be tried as one of the modalities of treatment in persistent lipoid pneumonia.

This communication highlights the successful use of steroids in the treatment of lipoid pneumonia.

REFERENCES

1. Bandla HPR, Scott H, Davis SH, Hopkins NE. Lipoid pneumonia: a silent complication of mineral oil aspiration. *Pediatrics* 1999;103:e19.
2. Gondouin A, Manzoni P, Ranfaing E, Brun J, Cadranel J, Sadoun D, *et al*. Exogenous lipoid pneumonia: a retrospective multicentre study of 44 cases in France. *Eur Respir J* 1996;9:1463-9.
3. Zanetti G, Marchiori E, Gasparetto TD, Escuissato DL, Souza SA. Lipoid pneumonia in children following aspiration of mineral oil used in the treatment of constipation: high resolution CT findings in 17 patients. *Pediatr Radiol* 2007;37:1135-9.
4. Sias SMA, Ferreira AS, Daltro PA, Caetano RL, Moreira JS, Quirico-Santos T. Evolution of exogenous lipoid pneumonia in children: clinical aspects, radiological aspects and the role of bronchoalveolar lavage. *J Bras Pneumol* 2009;9:839-45.
5. Mahadevan S, Ananthkrishnan S, Srinivasan S. Lipoid pneumonia in South Indian infants. *Indian Pediatr* 1991;28:1529-30.
6. Annobil SH, Tahir MEL, Kameswaran M, Morad N. Olive oil aspiration pneumonia (lipoid) in children. *Trop Health* 1997;2:383-8.
7. Chin NK, Hui KP, Sinniah R, Chan TB. Idiopathic lipoid pneumonia in an adult treated with prednisolone. *Chest* 1994;105:956-7.
8. Hussain IR, Edenborough FP, Wilson RS, Stableforth DE. Severe lipoid pneumonia following attempted suicide by mineral oil immersion. *Thorax* 1996;51:652-3.
9. Russo R, Chiumello D, Cassani G, Maiocchi G, Gattinoni L. Case of exogenous lipoid pneumonia: steroid therapy and lung lavage with an emulsifier. *Anesthesiology* 2006;104:197-8.

