Respiratory Medicine Case Reports 33 (2021) 101380

Contents lists available at ScienceDirect

Respiratory Medicine Case Reports

journal homepage: http://www.elsevier.com/locate/rmcr

Case report

Shine like gold and sparkle like glitter: Three cases of lipoid pneumonia

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ARTICLE INFO

Keywords:
Lipoid pneumonia
Cholesterol pneumonia
Lipid laden macrophages
Fat stains
Bronchoalveolar lavage

ABSTRACT

Lipoid pneumonia (LP) is an unwonted, mostly asymptomatic entity which has no classical radiological appearance. It can be endogenous or exogenous depending upon the type of exposure or underlying milieu. It simulates a number of infective and malignant respiratory conditions and can go undiagnosed or delayed leading to morbidity and mortality. We put forward three cases that initially presented as classical pneumonia, but on further assessment and investigations were diagnosed to be LP. All the three cases manifested with symptoms of fever, productive cough and breathlessness. Chest Xray and CT scan were indicative of consolidation. Bronchoalveolar lavage (BAL) evinced lipid laden macrophages that stained positive with fat stains (Sudan IV and Oil Red O). Two cases were endogenous and one was exogenous type. LP, owing to its nonspecific clinical presentation and radiographic signs, needs a high index of suspicion, and a detailed clinical history for accurate diagnosis. Corroboration of lipid laden alveolar macrophages in BAL is the crux to the diagnosis. Hence, clinicians should be cognizant of this condition and rule out LP in cases of non-resolving pneumonia in an appropriate clinical context.

1. Introduction

Lipoid pneumonia (LP) is a rare and neglected diagnosis with symptoms like chronic cough, breathlessness, and haemoptysis. Its nonspecific presentation compounded with often inadequate history adds to the conundrum. LP occurs due to accumulation of fat-like substances in the pulmonary architecture which are either of animal, mineral or vegetable in origin [1,2]. It was first described by Laughlin in the year 1925 [3].

Due to its close appearance and overlapping features with pneumonia it has several names like cholesterol pneumonia, paraffinoma, and gold pneumonia [4]. We present hereby three interesting cases of this rare entity.

2. Case presentation

2.1. Case 1

A 72 year old man presented with a 15-day history of fever, productive cough, purulent sputum and breathlessness accompanied by an evening rise of temperature and weight loss. Clinical examination disclosed digital clubbing with crepitation's in right lower lobe areas. A provisional diagnosis of right lower lobe pneumonia with differential of pulmonary tuberculosis (PTB) was made. Erythrocyte sedimentation rate (ESR) was elevated. Sputum for acid fast bacilli (AFB) by stain and AFB culture were negative. Chest X-ray, ultrasound chest and contrast-enhanced computed tomography (CECT) chest were done, which unveiled consolidatory changes in the right lower lobe and loculated right pleural effusion (Fig. 1). A combination of Piperacillin, Tazobactum and Clindamycin IV antibiotics was started. Pleural fluid was aspirated. Pleural fluid cytology was negative for malignant cells and lymphocytosis was seen on fluid leukocyte differential counts. Hinged on the

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https://doi.org/10.1016/j.rmcr.2021.101380
Received 4 October 2020; Received in revised form 20 January 2021; Accepted 3 March 2021
Available online 9 March 2021

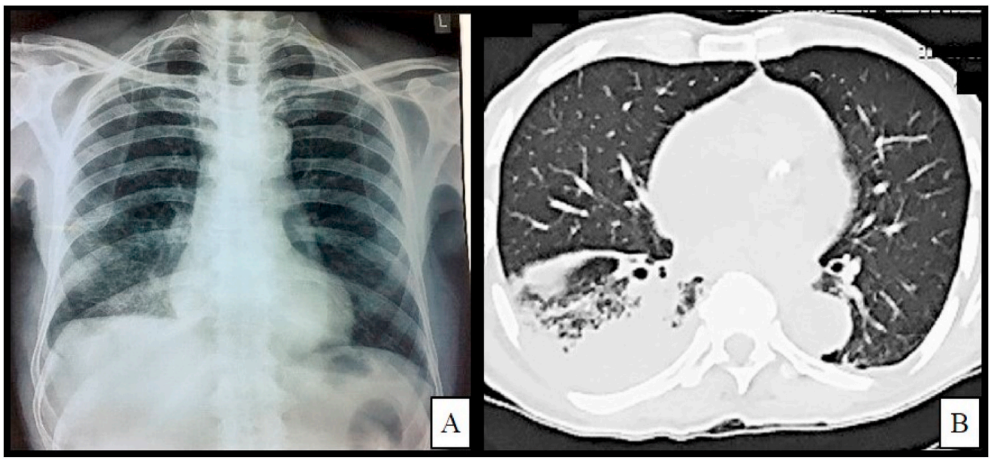

Fig. 1. Chest Xray showing right sided non homogenous opacity (A) and CECT chest transverse section showing right posterior basal consolidation with effusion(B).

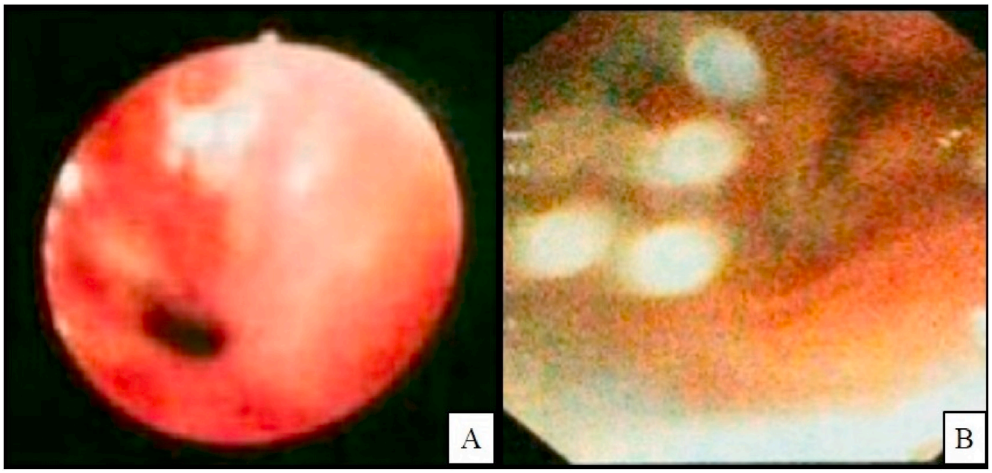

Fig. 2. Bronchoscopic view shows (A) yellow glittery debris, (B) gelatinous yellow blobs. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

combination of pleural fluid lymphocytosis, elevated ESR and CECT findings, patient was started on empirical anti-tubercular therapy (ATT). Bronchoscopy with bronchial aspirate and bronchoalveolar lavage (BAL) was performed. Culture of BAL was sterile. Aspirates were negative for AFB on staining as well as GeneXpert. The turbid appearance of BAL prompted the pulmonologist to request for staining of fat globules. Fat stain, i.e., Sudan IV, was positive, denoting a diagnosis of lipoid pneumonia, endogenous type. Patient was continued on ATT & follow up after 6 months showed resolution of symptoms with minimal residual right sided pleural thickening persisting.

2.2. Case 2

A 29 year old man presented with problems of fever, breathlessness and productive cough. Clinical examination revealed decreased breath sounds and basal crepitations on the left side. Biochemical investigations and culture were normal. Chest X-ray, USG chest and CECT chest documented features of left sided consolidation/mass lesion and pleural effusion. Bronchoscopy showed yellow glittery debris (Fig. 2A) in the bronchi. Fine needle cytology was done, mindful of a suspected mass, however, it showed only finely vacuolated macrophages in a predominantly haemorrhagic smear. Sudan IV staining of the BAL fluid exhibited orange red pigment in the macrophages, confirming the diagnosis of LP. Patient negated any history of ingestion or aspiration of liquids. Accordingly, diagnosis was surmised to be endogenous idiopathic type of LP. The patient was treated with parenteral cephalosporins for a week. This patient was lost for follow-up.

2.3. Case 3

A 56 year old woman presented with ailments of fever, cough and breathlessness since one week. She did not suffer from any comorbidities or occupational exposure. Blood investigations and general examination were normal. Decreased intensity of breath sounds over the right side and basal crepitations were the finding on auscultation. Sputum and blood cultures were negative for any organism. Chest X-ray and CECT chest detected right sided consolidation. Bronchoscopy demonstrated gelatinous yellow blobs (Fig. 2B). BAL cytology displayed macrophages with foamy cytoplasm and these stained positive for fat. The vacuoles were variably sized. On persistent questioning, the woman declared history of ingestion of an oil based Ayurveda medication for over a year. Consequently, she was diagnosed with exogenous type of LP. The patient was treated with antibiotics and recovered well symptomatically and with radiological clearance after 6 months.

3. Discussion

The incidence of LP is unknown. Autopsy data connote it to be around 1–2.5% of pulmonary findings [5].

There are two varieties of LP – exogenous and endogenous.

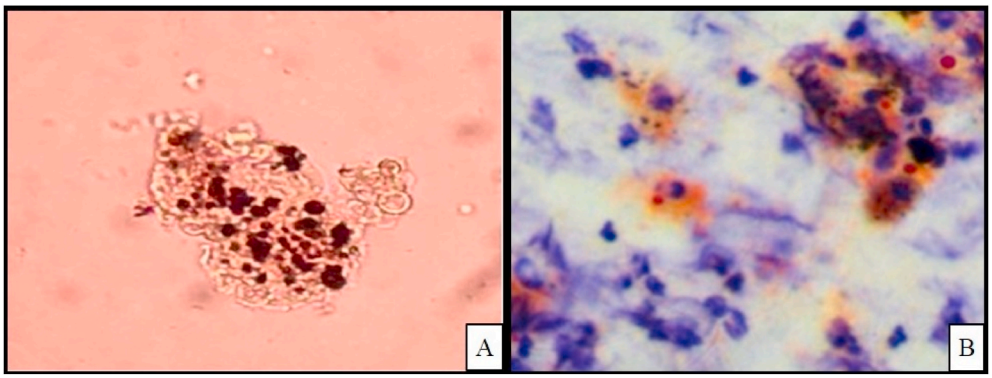

Fig. 3. Oil Red O stain demonstrating fat laden macrophages staining as red globules (100×) (A) and Sudan IV (B). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

Exogenous LP ensues from inhalation or aspiration of fatty materials like oily nose drops, vaporized paraffin from burning candles, nasal decongestants, herbicide, and use of flammable liquids [6–8]. Case three had a history of consumption of Ayurvedic medication. Ayurveda is a traditional alternative medicine system widely prevalent in India which comprises of therapies based on herbal plants, minerals & metals. Habitual use of bland oil-based laxative agents that are bland and do not trigger cough reflex are likely to result in aspiration in the elderly and lead to LP. Once this substance reaches the alveoli, it is engulfed by macrophages post emulsification. Since alveolar macrophages are unable to metabolize the fatty substance, they are recurrently released into the alveoli when the macrophage dies. This impels to a giant cell granulomatous reaction, with chronic inflammation, and alveolar and interstitial fibrosis [9]. Exogenous lipoid pneumonia reveals lipid-laden macrophages distending the alveoli and interstitial space. Lipid material may be amassed in these areas. Other corroborative pathological features in exogenous LP are inflammatory cells, multinucleated cells and fibrosis (in chronic cases). Alveolar hemorrhage may be co-existent [10].

Endogenous LP embodies chronic inflammatory foci of cholesterol and its esters, derived from destroyed alveolar walls located either behind a bronchial obstruction or in lung parenchyma at a site of chronic suppuration. This can be discerned in conditions like sarcoidosis, lung cancer after chemotherapy or radiotherapy, organizing pneumonia, bronchiolitis obliterans, connective tissue disorders and can even be idiopathic [11,12]. An explicit etiology could not be established in first two cases and they were considered as idiopathic endogenous type.

LP presents with prodromes of cough, dyspnoea, intermittent fever, chest pain and can even be asymptomatic in many cases. Its presentation relies upon the age, duration and type of exposure. The asymptomatic individuals might have substantial radiological features that are detected incidentally. Frequently, the symptoms are due to development of secondary infection in affected lobe or segment of the lung. The first patient described in our cases manifested with symptoms of fever, cough and weight loss. In India, where tuberculosis (TB) is rife, our initial suspicion was of TB. Case two was presumed to be a malignant lesion but investigations revealed a surprising diagnosis of LP. Clinicians should be prudent in these scenarios as LP can mimic many infective and malignant conditions like TB and lung cancer [13].

Diagnosis of LP is perplexing as the clinical features and signs are nonspecific. Chest x-ray in LP may show features of consolidation on the right lower lobe segments which are prone for aspiration with reactional pleural effusion. The consolidation generally is longstanding, and non-resolving. CXR may even be normal. CECT chest patterns described are airspace consolidations, ground glass opacities, crazy paving pattern, interlobular septal thickening, and mass-like lesions [14].

The investigation of choice for a confirmative diagnosis is BAL/biopsy [11]. Histopathology of biopsy specimen shows an accumulation of macrophages with vacuolated foamy cytoplasm in the alveoli [15]. Multivacuolated macrophages need not always be lipid laden macrophages. Alveolar macrophages can show foamy, finely vesiculated, or vacuolated cytoplasm. It can be associated with acute inflammation, drugs (e.g., amiodarone), reactive processes, or infection. Exogenous LP shows large vacuoles and multinucleated foreign body giant cells. Amiodarone toxicity shows multivesiculation in the pneumocytes as well.

Oil Red O and Sudan stains can be utilitarian in confirming the diagnosis of LP which was done in our cases (Fig. 3). The specimen for fat staining should not be submitted in alcohol-based fixatives or formalin. Both remove lipids and diminish the test sensitivity. Paraffin embedding of biopsies also pose the same risk. An exemplary specimen would be cytospin smear of lavage or unfixed biopsy. A diagnostic pitfall to be aware of is that neutrophils can stain with oil Red O. LLAM index is a more specific way of diagnosing LP in which the intracellular lipid within the macrophages is evaluated. Increased number of lipid droplets obscuring cytoplasm is a discrete feature of LP. Extracellular lipid is another unequivocal finding stated by some observers. Oil Red O staining has a greater role in exogenous LP collated to other special stains. Naked eye examination of BAL can reveal lipid layer on top as was seen in one of our cases. Foamy background with varied empty vacuoles and multinucleated giant cells are also helpful indicators [15].

The key to treatment of LP is not well-established, but, avoidance of exposure, supportive care, antibiotics for infections, steroids and immunomodulators have been tried [12,16]. The pivotal point before starting steroids is to rule out TB and confirm the diagnosis of LP.

4. Conclusion

LP is an unfamiliar and often overlooked clinical entity. It can resemble many infective or malignant respiratory conditions. LP is probably one of the understated causes for non-resolving pneumonia in view of its indolent symptoms. In our case series, patient presentations were indistinguishable from bacterial pneumonia and TB. The diagnosis of LP is often overlooked or delayed as it requires a high index of clinical suspicion. Due to its non-specific clinical presentation and radiographic signs, comprehensive history and microscopic features are the cornerstones of diagnosis. Clinicians should be au courant with this condition.

5. Clinical pearls

- Lipoid pneumonia is one of the causes for non-resolving pneumonia.
- LP should be suspected in pneumonia in elderly with altered deglutition reflex.
- Exhaustive history of consumption of oil based laxatives, nasal drops or aspiration should be obtained in suspected cases.

- Pneumonia in right lower lobes of the lung radiologically non-progressive over a period of time may suggest LP.
- Demonstration of lipid laden alveolar macrophages in BAL is diagnostic of LP with a concomitant clinical history.

Author contributions

Vishak Acharya; conceptualization, validation, review and editing. **Nikhil Victor Dsouza;** data curation, original draft preparation and editing. **Saraswathy Sreeram;** data curation, original draft preparation and editing. **Santosh P V Rai;** supervision, validation, review and editing. **Basavaprabhu Achappa;** conceptualization, review and editing.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of competing interest

All Authors (Vishak Acharya, Nikhil Victor Dsouza, Saraswathy Sreeram, Santosh P.V. Rai, and Basavaprabhu Achappa) declare that they have no conflict of interest and all have contributed in the case report.

Acknowledgement

None.

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