Bahrain Medical Bulletin, Vol.24, No. 4, December 2002

Lipid Pneumonia in the Pediatric Age Group and its Complications

Hanaa Banjar, MD, FRCPC*

Objective: Exogenous lipid pneumonia is an uncommon condition resulting from an aspiration or inhalation of fat like material. This condition is considered a common disease in developed countries. Our aim is to present the experience in a tertiary care centre in Saudi Arabia.

Method: A retrospective review of all cases presented to our center over 16 years period (from 1984- 2000). We evaluated the demographic data, the different type of presentations, diagnostic modalities and therapeutic data.

Results: A total of 25 patients, 14 females, 11 males, were seen. Twenty-two are alive (88%) and 3 died (12%). Age at diagnosis was 15± 9 month. Period of follow up was 42 ± 56 month. In 80% of the patients, a history of lipid intake through oral route was confirmed in 15 (60%) of the patients for a period of 2-14 month, with a mean of 6.3 month. Chest x-ray showed mainly consolidation in 23 (92%) patients and atelectasis in 18 (72%). The right lower lobe (RLL) was the predominant lobe involved in 20 (80%). The most common complication encountered was persistent atelectasis in 17 (68%), followed by gastroesohageal reflux in 12 (48%). Bonchiectasis was common in RLL in 6 (24%) patients. Pulmonary function tests showed combined obstructive and restrictive lung disease in 3 (12%) patients. Steroid was used in 21 (84%) patients and inhaled salbutamol in 14 (56%). Diseases that are associated with patients with lipid pneumonia were mainly those of asthma in 10 (40%) patients.

Conclusion: Lipid pneumonia is an uncommon disease in Saudi Arabia. Physicians should be aware of this condition in patients with chest infection, not responding to conventional treatment. Steroids may improve the chest findings.

Bahrain Med Bull 2002;24(4):

Exogenous lipid pneumonia is an uncommon condition resulting from aspirating or inhaling fat like material, such as mineral oil found in laxatives and various aerosolized industrial materials. These substances elicit a foreign body reaction and proliferative fibrosis in the lung. Because symptoms are absent or nonspecific and the roentrogenographic findings simulate other diseases, exogenous lipid pneumonia is often unrecognized. Yet appropriate historical inquiries and simple laboratory tests can lead to the correct diagnosis, removal of the offending agent, and, potentially, improvement in lung function before serious complications develop[1].

---

*Consultant Pediatric Pulmonologist
Department of Pediatrics
King Faisal Specialist Hospital and Research Center (KFSH&RC)
Riyadh, Saudi Arabia

Mineral oil enters the tracheobronchial tree without stimulating glottic closure or the cough reflex. It impairs the mucociliary transport system. Recumbency, sedations, or the presence of a mild anesthetic, such as menthol, in the product may further encourage aspiration and the flow of the oil into the alveoli. Lipid pneumonia has been most frequently seen in debilitated infants and adults, many with neurological or gastrointestinal disorders affecting swallowing, palatal or cough mechanisms and thus predisposing to aspiration of oropharyngeal or gastric contents[1].

The initial response in the alveoli is lipid-laden macrophages called lipophages, where the cytoplasmic droplets, which give them a foamy appearance may distort and displace the cell nucleus peripherally[4]. With time, a proliferative, fibrotic reaction develops and the lesions, which may become nodules or masses, grow firmer and turn gray-white. Similar elastic tissue degeneration of the walls of the bronchi and bronchioles can lead to bronchiectasis[1,4].

Several reports of lipoid pneumonia, especially in infants and small children, have originated from traditional folk remedies. In Saudi Arabia oily nose drops are still used and animal fats, such as ghee (clarified butter made from goats' milk), are often fed forcibly to establish regular bowel habits or administered transnasally to treat coughs and colds[2,3].

Riff et al, described 8 cases presented between 2-8 months of age[2]. Symptoms mainly were dry cough and recurrent febrile illness that required hospitalization for pneumonia. Most patients improved with removal of offending agents and steroid treatment[2]. Pathological findings mainly: Lipid laden macrophages in the alveoli, lymphocyte infiltration and formation of multinucleated giant cells. Fibrosis may develop in advanced stage with arteriolar muscular walls are replaced by fibrous tissue and granulomatous formation that surrounds large coalesced macrophages that are filled with lipid[2].

In our report, we have retrospectively reviewed all patients with lipid pneumonia over 16 years period as a tertiary care center, and presented its complication and type of treatment used.

METHODS

All records of patients diagnosed as lipid pneumonia were reviewed from the period 1984-2000. Demographic data, type of presentation, laboratory and radiological data were identified. Type of diagnostic modality, treatment and complications were presented. The statistical analysis was performed using JMP statistical package (Version 3.2, SAS Institute Inc.). For continuous variables, means, standard deviation and median were calculated using student t-test.

RESULTS

A total of 25 patients, 14 females, 11 males were seen. Sixteen (72%) of them were from the southern province of Saudi Arabia, 5 (20%) from the western province, 1 (4%) from the eastern province, and another 1 (4%) from the northern province. Twenty-two are alive (88%) and 3 died (12%). Age at diagnosis was 15± 9 month, with an average of 0.7- 35 month. Age at follow up was 57 ± 54 month with an

average of 0.3-15 years. Period of follow up was 42 ± 56 month with an average of 0.7-174 month. In 80% of the patients confirmed history of lipid intake through oral route was confirmed in 15 (60%) of the patients, 2 (8%) by oral and nasal route, 3 (12%) by nasal route and 5 (20%) of them were unable to identify definite history of lipid intake. The length of lipid intake ranged from 2-14 month, with a mean of 6.3 month. Chest x-ray and computerized tomography scan (CT) showed consolidation in 23 (92%) of the patients, atelectasis in 18 (72%), interstitial infiltrate in 8 (32%), peribronchial wall thickening in 7 (28%), cardiomegaly in 6 (24%), and lymphadenopathy in 5 (20%). The right lower lobe (RLL) was the predominant lobe involved in 20 (80%), followed by Right upper lobe (RUL) in 19 (76%) (Table 1).

Table 1. **Location of lobes involved in lipid pneumonia (Total 25 patients)**

Lobes	Number	%
RUL	12	48
RML	5	20
RLL	19	76
LUL	4	16
LINGULA	2	8
LLL	20	80

RUL- Right upper lobe, RML- Right middle lobe
RLL- Right lower lobe, LUL- Left upper lobe
LLL- Left lower lobe

The most common complication encountered was persistent atelectasis in 17 (68%), followed by gastroesohageal reflux in 12 (48%) and oxygen use for a long period of time in 10 (40%) of the patients (Table 2). Bonchiectasis location was common in Right lower lobe (RLL) in 6 (24%) of the patients, followed by 2 (8%) in Right upper lobe (RUL), and 2 (8%) in Left lower lobe (LLL).

Table 2. **Complication of lipid pneumonia (Total 25 patients)**

Complication	Number	%
Oxygen dependant	10	40
Bronchiectasis	6	24
Ventilation	4	16
Persistent atelectasis	17	68
Antibiotic treatment	19	76
Gastro-esophageal reflux	12	48
Cystic lung disease ♣	1	4
Cor-pulmonale	1	4

♣ - *Necrotizing pneumonia*

Diagnosis was made mainly by lung biopsy in 16 (64%) of the patients (Table 3). The treatment used was mainly steroid in 21 (84%) of the patients, inhaled salbutamol and steroid in 14 (56%) of the patients, broad-spectrum antibiotic in 16 (64%), and diuretics in 3 (12%). Diseases that are associated with lipid pneumonia was mainly

those of asthma in 10 (40%) of the patients, followed by immunodeficiency in 4 (16%) (Table 4). The most common pathogen encountered in respiratory or tissue cultures were: Respiratory syncytial virus (RSV) in 2 (8%), pseudomonas aeruginosa in 2 (8%), and branhamella cattarhalis in 2 (8%) (Table 5). Pulmonary function tests were done in 3 patients, showed combined obstructive and restrictive lung disease in 3 (12%) of the patients (Table 6).

Table 3. **Type of diagnostic modalities (Total 25 Patients)**

Number	Number	%
(FNA) ♣	7	28
BAL ♥	2	8
Lung BX ♫	16	64
Lobectomy	4	16
Lobectomy X 2	2	8

♣ - *FNA- Fine needle aspiration*
♥ - B*AL- Broncho-Alveolar lavage*
♫ - *Lung Bx- Lung biopsy*

Table 4. **Diseases associated with lipid pneumonia (Total 25 patients)**

Disease	Number	%
Lipid pneumonia alone	17	68
Lipid pneumonia + other disease	8	32
Chronic ear infection	2	8
Hypogamma globulinemia♣	4	16
Barre lymphocyte syndrome♣	3	12
PPD converter	2	8
Hydrocephalus	1	4
Eosinophilic infilterate	1	4
Asthma	10	40

♣: *immunodeficiency syndrome*.

Table 5. **Type of pathogens in patients with lipid pneumonia**

Pathogens	Number	%
Positive cultures	7	28
Negative culture	18	72
RSV	2	8
CMV	1	4
Pseudomonas Aeruginosa	2	8
Candida	1	4
Branhamella Cattharralis	2	8
Hemophilus influenza	1	4
Adeno virus	1	4

RSV- *Respiratory syncytial virus,* CMV- *Cytomegalo virus*

Table 6. Pulmonary function test (PFT)- Total 3 patients †

Value	Average	Mean
FVC	68-90	77
FEV1	58-90	77
FEV1/ FVC	85-117	97
MMEF 25-75%	27-94	59
PEF	51-98	78
FRC	85-114	95
RV	43-139	91
TLC	61-93	82
RV/TLC ratio	200-38	27
RV/ TLC %	70-154	105

†- *Values are expressed in percentage*
FVC- *Forced vital capacity*
FEV1- *Forced expiratory volume in one second*
MMEF- *Maximum mid expiratory flow*
PEF- *Peak expiratory flow*
FRC- *Functional residual capacity*
RV-*Residual volume*
TLC- *Total lung capacity*

DISCUSSION

Previous reports of lipid pneumonia in Saudi Arabia did not discuss complications or other diseases associated with it[2,3]. In our report, we have shown that lipid pneumonia was associated with immunodeficiency in 4 patients, and may have complicated the course of the disease and its treatment. Asthma was a common problem encountered in our report in 10 (40%) of the patients who needed prolonged anti asthmatic use and may have delayed the diagnosis due to similar presentations and partial response to treatment. Gatroesophageal reflux was a common complication in our patients encountered in 12 (48%), which could have been the cause of aspiration of lipid especially in patients who had oral intake of lipid and not through nasal route. This association was not mentioned in previous report from the same country[2,3]. Review of the literature has shown that lipid pneumonia is associated with gastro esophageal reflux in patients with nasogastric tube feeding[5,6]. Eosinophilic infiltrate was reported for the first time in the literature in one of our patient with lipid pneumonia (Table 2)[7]. RLL and LLL were the main lobes involved in our population in 20 (80%) and 19 (76%) of patients respectively, which confirms the findings of previous report as Bronchiectasis as a complication[2,3]. We have shown that a good number of our population 6 (24%) have developed bronchiectasis, probably due to delayed diagnosis and concomitant presence of immunodeficiency disease in the same patient. Antibiotic treatment was used concomitantly with steroid treatment in 19 (76%) of the patients as prophylaxis to prevent super infection with bacteria or pneumocystis carinii pneumonia especially in patients with immunodeficiency. Oxygen was used in a high percent of our population 10 (40%) for many months due to severity of lung involvement. Only one patient developed cor pulmonale due to chronic hypoxemia.

Lung biopsy was the main modality used in the diagnosis of our patients due to early presentation and unavailability of standardized Bronchio-alveolar lavage (BAL)

procedure in the pediatric age group. Lobectomy was used in 4 patients due to severe infection and abscess formation. Purified protein derivative (PPD) were positive after being negative in 2 patients during follow up, which needed treatment with anti-tuberculous (TB) treatment. This confirms previous report of increase susceptibility to TB infection in patients with lipid pneumonia[10]. Concomitant bacterial and viral infection were encountered in 7 (28%) of our population, which may have complicated the course of the disease and prolonged antibiotic use.

CONCLUSION

Lipid pneumonia is not an uncommon disease in Saudi Arabia. Physicians should ask routinely and repeatedly all patients with repeated chest infection about lipid intake. Lipid pneumonia secondary to gastroesophageal reflux should be entertained in patients with NGT feeding and persistent pneumonia. Steroid is useful in the treatment of this disease.

REFERENCES

1. Spickered A, Hirshman JV. Exogenous Lipoid Pneumonia. Arch Intern Med 1994;154: 686-92.
2. Riff EJ, Moore C, Tufenkeji H, et al. Infantile lipoid pneumonia. Ann Saudi Med 1990;10:378-82.
3. Hugosson CO, Riff EJ, Moore CCM, et al. Lipoid pneumonia in infants; a radiographical-pathological study. Pediatr Radiol 1991;21:193-7.
4. Fox B. Liquid paraffin pneumonia: with chemical analysis and electron microscopy. Virchow Arh A Pathol Anat Histol 1979:382:339-46.
5. Kurlandsky L, Vaandrager V, Davy C, et al. Lipid pneumonia in association with Gastro esophageal reflux. Pediatric pulmonology 1992;13:185-8.
6. Wolfson BJ, Allen JL, Panitch HB, et al. Lipid aspiration pneumonia due to gatroesophageal reflux: a complication of nasogastric lipid feedings. Pediatr Radiol 1989;19:545-7.
7. Banjar H. The Ugly side of Ghee Aspiration and traditional Herbal medicine causing Lipid pneumonia and Eosinophilic Granuloma. The Kuwait Medical journal. March 2001;33:97-8.
8. Brody JS, Levin B. Interlobular septa thickening in lipid pneumonia. AJR Am J Roentgenol 1962;88:1061-9.
9. Subramanian S, Kherdekar SS, Baby PGV, et al. Lipoid pneumonia with Cryptococcus neoformans colonization. Thorax 1982;37:319-20.
10. Hutchins GM, Boitnott JK. A typical mycobacterial infection complicating mineral oil pneumonia. JAMA 1978;240:539-41.