Lipoid Pneumonia in Neuropsychiatric and Debilitated Patients

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Lipoid pneumonia is a relatively recent clinical entity which has attracted much attention in medical literature in the past two decades and during the last year the dangers associated with continued and excessive use of mineral oil have been stressed. Formerly believed to be a disease among children following the use of oily nose drops, the condition is not as uncommon in adults as was previously thought.

The four cases presented in this paper were collected from seventy-three consecutive autopsies performed at this hospital. It is not surprising that lipoid pneumonia should occur with relative frequency in neuropsychiatric patients, particularly, where intellectual and emotional regression to the infantile level has taken place. Feedings and medications can be administered to these patients often only when the greatest difficulty and the aspiration of oily medications is a constant hazard. This is especially true in advanced bulbar palsies of various types where deglutition has been impaired and in those patients who are bedridden and confined to wheel-chairs. The inactive patient is a constant feeding problem and often has sluggish, irregular bowel movements and is frequently in need of laxatives. Mineral oil and cascara have been the favorite medications for this purpose over a period of years and were formerly considered innocuous; however, it has been amply pointed out by Sweeney that mineral oil is often the offender in lipoid pneumonia. In his compilation of one hundred and thirty-one adult cases he showed that the use of mineral oil as a laxative accounted for one half the series.

REPORT OF CASES

Case 1: J. T. M., a 52 year old white male was admitted to the hospital in April 1939, in the advanced stage of postencephalitic Parkinson’s disease, with marked impairment of locomotion, pill-rolling tremor, mask-like facies, and drooling at the mouth. Hospitalization under close supervision was necessary to assist him in eating, bathing, and walking around the ward and grounds. Medication consisted of atropine, hyoscine and various vitamin preparations. Early in the course of hospitalization it

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was noted that the patient's bowel movements were irregular and mineral oil was given regularly once or twice a week.

In January 1941, it was noted that the patient was becoming frequently subject to "colds." At this time he developed what was interpreted as a bronchopneumonia. Mineral oil was continued in doses of one ounce twice a week. In April 1942, a routine chest plate showed only slight peribronchial thickening, more marked in the right lung, which was interpreted as a low grade bronchitis.

In December 1942, the patient developed his second bout of pneumonia. The pneumonia lasted four days and the patient made an uneventful recovery. Following this he developed a chronic cough.

In January 1944, the patient developed his third attack of bronchopneumonia with an intermittent fever, sometimes reaching 105 degrees F. The patient was critically ill but recovered after three weeks. X-ray film at this time revealed moderate peribronchial infiltration confined mostly to the right middle and lower lobes. It is of interest to note that in April 1946, two years and three months later, while the patient was supposedly completely well, a routine chest film revealed peribronchial infiltration at the right base and right middle lobe, similar to film taken during previous illness.

The terminal illness began one year later with weakness, anorexia, high fever, and a rapid pulse. Chest films taken at this time showed peribronchial infiltration involving primarily the lower lobes of both lungs, but more marked on the right where the upper lobe was also involved. Rales developed in both bases and in spite of penicillin, fluids and oxygen therapy, the patient expired.

Necropsy findings were essentially negative except for the lungs which were free in the pleural cavities and exhibited dark red color and bogginess characteristic of an advanced pneumatic process with consolidation. Microscopic examination of the lung tissue revealed masses of polymorphonuclear leukocytes and debris filling the alveoli and bronchioles with a number of phagocytes filled with lipoid droplets.

Case 2: J.H., a 41 year old white male entered the hospital in April 1934. A diagnosis of Huntington's chorea was made and his course of hospitalization was that of a typical case with progressive mental enfeeblement and increase in neurological symptoms. In October 1943, it was first noted that the patient had difficulty in swallowing food and medications. Shortly thereafter his bowel movements became irregular and mineral oil and cascara were administered at regular intervals. Mineral oil and cascara were given once a week every week for the last three years of his life.

The patient continued to fail and one month before death developed a low grade fever and cough with moderate cyanosis and dyspnea. A chest film at this time revealed a diffuse peribronchial thickening involving primarily the right middle and lower lobes with evidence of infiltration (Fig. 1). In spite of specific and supportive therapy the patient expired.

At necropsy the right lung appeared to be partially collapsed and lay in 800 cc. of hemolized blood in the pleural cavity. The entire middle lobe was dense and firm and on section it was yellowish and increased in consistency with no increase in fluid. There was a fibrous exudate over the pleural surface with a few broken adhesive tags. The left lung was bound down by firm adhesions laterally and the lower three fourths
showed decreased crepitus and was boggy and dark red; on section fluid was markedly increased with purulent areas. The pleural cavity was empty. Sections of the brain showed atrophy of the caudate nucleus and other findings characteristic of Huntington's chorea.

Microscopic study of lung sections showed pus cells in many alveoli, often forming small abscesses. Macrophages filled with lipoid material or droplets, predominated in other areas. There was considerable fibrosis with thickening of the alveolar wall (Fig. 2).

Case 3: S. S., a 65 year old white male was admitted to the hospital with a right cerebral thrombosis. A few days after admission it was noted that the patient was constipated. Petrogalar and phenolphthalein were administered. For the next seven months the patient received these drugs in one ounce doses one to three times a week. The orders were then changed to mineral oil and cascara and this was administered once or twice a week for three months.

Five months later the patient developed his first attack of "pneumonia." At that time he complained of a pain in the left chest. He had a low grade fever, never exceeding 100.2 degrees F. rectally. The chest findings were completely negative. A chest plate at that time was reported as normal. The patient was treated symptomatically with some improvement. He developed a hacking chronic cough productive of thick, white sputum. Six months later he again developed a pain in the left chest and a "cold." X-ray plate at this time showed "marked accentuation of the bronchovascular tree" and "increased density in the left

FIGURE 1: Chest plate of patient in Case II. Note peribronchial thickening in region of right cardiophrenic angle. There is a soft area of infiltration seen in the central portion of right lower lobe (arrow).
lower lobe suggesting pneumonitis." The patient recovered from this illness but his cough increased in frequency and severity.

Eight months later the patient had another chest plate because of chronic cough and low grade fever. This was read as "chronic bronchitis" and "slight infiltration in left lower lobe suggesting pneumonitis."

Four months before death, while the patient was considered asymptomatic, a routine chest plate was done during a tuberculosis survey. This plate was identical with those taken during the episodes of "pneumonia" showing an increase in bronchovascular markings with a similar area of infiltration in left lower lobe.

It is of interest to note that no oily substances were administered to the patient thirty months prior to his death. In spite of this the patient's course was downhill. He developed low grade fever, cyanosis, signs of respiratory embarrassment, and finally expired in spite of supportive therapy.

The pulmonic pathological changes were of interest despite the apparent demise of the patient from a coronary accident. The lungs were free in the pleural cavities which were empty. Anthracosis was present, grade 2. The weight of the left lung was 480 grams and it contained many poorly outlined, rubbery nodules which varied between 1 cm. and 4.5 cm. in diameter. They were grey against the more or less normal lung tissue which served as a pink background. These nodules were scattered throughout all the lobes but were more numerous in the right lung which weighed 575 grams. The right lower lobe was boggy and dark red in color with a marked increase in consistency.

Microscopically the lung revealed a fibrous thickening of the alveolar...
walls with obliteration of many alveoli due to the connective tissue proliferation. The connective tissue and alveoli contained numerous foreign body giant cells (Fig. 3), many of these formed about circular clear spaces of varying dimensions which were assumed to be lipoid or oil droplets and which were demonstrated as such in microscopic preparations stained with fat stains. Also present were many macrophages filled with lipoid droplets.

Case 4: C. S., a 49 year old white male was admitted to this hospital in January 1944. The patient's grandmother, father, two sisters and two brothers had had Huntington's chorea. The patient developed choreiform movements twenty-two years prior to admission. These movements became progressively worse. He grew extremely irritable, depressed, and his reasoning and judgment became defective. He was admitted to this hospital for observation. Physical examination was essentially negative. Neurological examination revealed many choreiform, isolated and uncoordinated movements of all extremities. His speech was slurred and he had much difficulty in swallowing. The patient was given thiamin and nicotinic acid. Cod-liver oil was given twice a day, every day for forty-two days. Sixteen months after admission the patient developed a slight cough and began to run a low grade fever, never exceeding 100.6 degrees F. rectally. This condition lasted about ten days and cleared spontaneously without treatment. The patient got along fairly well until April of 1947 when he developed a chronic, hacking cough which persisted until the time of death. One week before death the patient developed a low grade fever and his cough increased. Coarse rales were heard at both bases. His color was ashen gray and the lips cyanotic. Supportive treatment was of no avail and the patient expired. No oily medications had been administered to this patient for thirty-one months previous to death. X-ray plates taken at intervals during hospitalization were unsatisfactory because of inability of patient to remain quiet enough for the exposure.

At necropsy the most pertinent findings were those of a bronchopneumonia. Of added interest was atrophy of the caudate nucleus with consequent internal hydrocephalus, so characteristic of Huntington's chorea. The lungs were small, the right weighing 330 grams. The upper lobe was aerated and pink, the lower lobes were darker and crepitus was absent in these two lobes. Fluid was slightly increased on cross section and froth decreased. The left lung weighed 605 grams, was reddish-brown on the pleural surface and on section it was firm and noncrepitant and was apparently the result of a well established pneumonic process. Microscopic examination of the lungs revealed many lipoid-filled macrophages in the alveoli with some monocytes and polymorphonuclear leukocytes.

Incidence

The reports of the incidence of lipoid pneumonia have varied and in many instances have included the type that occurs commonly in infants. This would tend to make the cases more numerous; however, in the last two decades, following the work of Laughlen in 1923, the use of oily nose drops in children was widely and generally condemned so that recent studies should show but very few cases in this age group. Pinkerton in 1927,
noted six cases in 290 consecutive necropsies, an incidence of 2 per cent. Ikeda in 1935, found an incidence of 7 per cent in children, and encountered five adult cases in an unrecorded series of necropsies, but no single instance in a series of thousands performed before 1932. Freiman et al in 1940, found 1.2 per cent in a series of 3500 necropsies in adults and Cannon recorded a percentage almost similar in 2000 adults. The four cases presented represent approximately 5.4 per cent in a consecutive series of necropsies.

**Diagnosis and Clinical Course**

It has been estimated that approximately one fourth of the cases are considered asymptomatic as far as the lipoid pneumonia is concerned, but often a careful review of the history following necropsy will reveal that what appeared to be a spontaneous bout of terminal pneumonia was actually the last of a series of pneumonic attacks over a long period of time which were superimposed on the fertile soil of a long-standing lipoid affair. A history of repeated respiratory and pulmonic infections, with a chronic cough between bouts, particularly in those individuals taking large amounts of mineral oil, cod-liver oil, or oil-agar preparations, should always suggest a lipoid pneumonic process as a predisposing factor and serial x-ray films taken over a period of time should lend further support to and increase the incidence of antemortem diagnosis. Patients with dysphagia are particularly prone to this disorder as well as the debilitated and bedridden patient who is constipated and who often is a feeding problem as well. The presence of oil in the sputum after the intake of oil, milk, cream or other fats have been restricted for some time is often of diagnostic importance, either by centrifugation and the use of fat stains, or by observing the oil drops on a bit of cigarette or tissue paper immersed in the specimen. Aspiration biopsy of the lung has also been suggested by Nathanson and his associates but one must consider that one might readily strike relatively normal areas due to the patchy distribution.

**Roentgenological Findings**

Moel and Taylor aptly called attention to the main roentgen findings in oil aspiration pneumonia. Early involvement manifests itself as an increase in the bronchial markings, usually on the right. These linear striations are often interpreted as bronchiectasis. The periphery of the lung is not involved. Later the shadows may become confluent and nodular, and they may have an irregular border which suggests the infiltrating nature of a malignancy (Fig. 1). The hilar shadows may or may not be en-
larged on the side of involvement. Parafinomas may occur forming a large oval mass of smooth outline usually located close to the hilar region.

The single most important factor in the x-ray diagnosis of this disease is the persistent nature of the lesions. Although the findings in the lung fields may be altered for brief periods by superimposed pulmonary infections, the underlying disease is always present and seen in interim films even though the patient may appear clinically asymptomatic at that time. The chief findings may show some progression even though the administration of oily substances is stopped (as in Case IV). This is probably due either to continued superimposed low grade infections at the site of involvement or to the proliferative nature of the disease.

X-ray findings are not specific and may be mistaken for bronchiectasis, tuberculosis, silicosis, bronchitis obliterans, and a host of other conditions. It is necessary to correlate the history, clinical findings, and chest plate in order to arrive at an early correct diagnosis.

Pathological Findings

The gross and microscopic pathological findings are characteristic in lipoid pneumonia, but vary due to the nature of the lipoid aspirated, the amount present in the lungs, and the length of time it has acted upon the lung tissue. The term "lipoid pneumonia" is used in this paper because it has become well established by long usage, actually it is a misnomer and the suggested names, such as pneumolipoidosis, are far more descriptive. The victims of this disease die from a pneumonia or pneumonitis, the lipoid reaction merely acts as a fertile background and constant and irrevocable predisposing factor.

Grossly the lungs are vaguely nodular and on section present rubbery nodules of varying diameters, which in addition to their typical elasticity, have a rather uncommon gray-yellow or gray-brown coloration which is poorly outlined and does not resemble any other process. In two of the cases presented lipoid pneumonia was diagnosed from the gross cut sections of the lung prior to verification by microscopic study.

Microscopically the mineral oil droplets are absorbed by macrophages which may fill the alveoli and produce a foamy appearance (Fig. 2). If the affair is of long standing or the oil is less bland, some fibrous tissue reaction results but in many instances the alveolar walls appear essentially normal and are unaffected by their contents. In Case III the mineral oil has served in part as a vehicle for phenolphtalein, a drug whose cathartic action depends on its irritative effect on the bowel mucosa. In this case
the connective tissue reaction is far more intense with a chronic inflammatory affair associated with masses of lymphocytes and giant cells forming about the oil droplets. To our knowledge the baleful effect of combinations of oil and phenolphthalein, when introduced into the lung, has not been previously described.

Treatment

The treatment of lipoid pneumonia is entirely prophylactic. It seems apparent from this study that oily medications are contraindicated in neuropsychiatric and debilitated patients. This is unequivocal in any patient with bulbar involvement. Substitution of non-oily laxatives for mineral oil should be easily accomplished with the wide field of laxatives from which to choose. Fat-soluble vitamins are better given in capsule form to these patients. It must be pointed out that mineral and animal oils in the lungs are not absorbed and despite discontinuance of the oil the clinical and x-ray findings will persist and in some instances progress as illustrated in Case III.

SUMMARY

1) Four cases of lipoid pneumonia in neuropsychiatric and debilitated patients are presented which represented 5.4 per cent in a series of seventy-three autopsies.

2) The diagnosis is based upon a history of ingestion of oily substances, repeated bouts of pneumonia, the demonstration of oily droplets in the sputum following a lipoid-free diet, and the x-ray findings.

3) The x-ray findings are not specific but they are characteristic in the sense that they are persistent even though the patient may be asymptomatic.

4) Pathologically the gross appearance of the lungs is highly suggestive and the microscopic findings are specific.

5) A particularly destructive type of lipoid pneumonia is demonstrated when the mineral oil is employed as a vehicle for phenolphthalein.

6) Treatment consists primarily in prophylaxis.

RESUMEN

1) Se presentan cuatro casos de neumonía lipoidea en pacientes neuropsiquiátricos y debilitados, que representan el 5.4 por ciento de una serie de setenta y tres autopsias.

2) Se basó el diagnóstico en la historia de la ingestión de sustancias acuosas, repetidos ataques de neumonía, la demostración de gotitas de aceite en el esputo subsiguiente a una dieta libre de lípidos y los hallazgos radiográficos.
3) Los hallazgos radiográficos no son específicos, pero son característicos en el sentido de que persisten aunque el paciente no tenga síntomas.

4) Patológicamente el aspecto macroscópico de los pulmones es muy sugestivo y los hallazgos microscópicos son específicos.

5) Se demuestra un tipo de neumonía lipoida particularmente destructiva que resulta cuando se emplea el aceite mineral como vehículo de la fenoltalina.

6) El tratamiento consiste principalmente de la profilaxia.

REFERENCES