Objective: To describe 2 cases of lipoid pneumonia in Mexican American infants after administration of vegetable- or animal-derived oils and the cultural barriers to diagnosis. Various folk remedies have been documented in the international medical literature that involve the oral or nasal administration of vegetable- or animal-derived oils to children for the treatment of common ailments, including nasal stuffiness, constipation, and colic. Lipoid pneumonia is a known complication of such practices in Mexico, India, Saudi Arabia, and other countries.

Methods: Case reports of 2 Mexican American infants with respiratory distress and interviews with 30 immigrant families of Mexican origin.

Results: In both cases, language and cultural barriers resulted in a delayed diagnosis of lipoid pneumonia. Interviews with immigrant families confirmed that oil administration to infants is a common traditional therapy in Mexican cultures.

Conclusions: These findings underscore the need for primary care providers to be aware of the traditional practice of oil administration to infants in many cultures, its pathophysiological consequences, the potential cultural barriers to timely diagnosis, and the opportunity to prevent cases of lipoid pneumonia through anticipatory guidance.

Oil-based home remedies for the treatment of various childhood ailments have been widely used in many different cultures and have been associated with significant respiratory disease. The presence of lipid droplets in the lungs of patients who had received mineral oil nose drops or laxatives was first described in 1925 by Laughlen.1 Since then, there have been numerous reports and reviews of the condition now referred to as exogenous lipoid pneumonia. Lipoid pneumonia due to aspiration of animal- or vegetable-derived oils is generally less severe than that caused by volatile hydrocarbon aspiration.2 However, aspiration of nonvolatile hydrocarbons such as mineral oil can cause significant lung inflammation and injury.1,3 Review of the current English- and non-English-language literature reveals that many reports on lipoid pneumonia originate in countries where cultural practices encourage the use of various oils or animal fat for common ailments in children.4-8 The following report illustrates how traditional Mexican healing practices resulted in lipoid pneumonia in 2 infants of immigrant families.

REPORT OF PATIENTS

PATIENT 1

An 8-week-old Mexican American male infant presented with persistent tachypnea. After an unremarkable prenatal course and birth, the patient was first noted by his mother to have tachypnea and cough on day 7 of life. He was subsequently admitted twice, at 3 and 6 weeks of age, to a community hospital for tachypnea, hypoxia, and hypercapnea (highest PCO₂, 58 mm Hg). Chest radiographs showed bilateral perihilar lung consolidation, mild hyperinflation, and right upper-lobe atelectasis. During both hospitalizations, he was treated with nasal continuous positive airway pressure and supplemental oxygen therapy, resulting in resolution of his hypercapnea but not his tachypnea. Results of a nuclear medicine gastric emptying study were normal, with no evidence of reflux, and results of fluorescent antibody tests for respiratory syncytial virus and Chlamydia species were negative. He was discharged home with ranitidine hydrochloride for presumed reflux but without an identified etiology for his symp-
toms. On presentation to his primary care physician 4 days after his second hospital discharge, he had significant retractions and persistent tachypnea, despite ranitidine treatment. He was referred for admission to our hospital for further care and evaluation.

Review of systems was remarkable for occasional emesis unrelated to feeding. He did not cough or choke with feeds, which consisted of breast milk by means of breastfeeding and bottle-feeding. He had no history of fevers, but he was noted to sweat during eating. There was no family history of respiratory diseases, and no history of toxic exposures was offered on repeated questioning. There were no pets or smokers in the home environment. When asked about medications, the mother stated that she gave him only ranitidine as prescribed during 1 of his previous hospital stays for presumed gastroesophageal reflux. She denied giving him any other treatments.

Admission physical examination revealed a well-developed, tachypneic boy with a respiratory rate of 68 to 80 breaths/min, heart rate of 166 beats/min, and oxygen saturation of 98% on room air. His weight was at the 25th percentile for age, and height was at the 50th percentile. The examination findings were notable for a mildly increased anteroposterior thoracic dimension and subtle Harrison’s grooves. Chest examination results disclosed normal expiratory phase duration and moderate suprasternal and subcostal retractions. Chest auscultation yielded diffuse, coarse crackles but good aeration bilaterally. Cardiac examination findings were unremarkable, and he had no clubbing of his digits.

Admission laboratory studies showed serum bicarbonate and capillary blood gas levels within the reference ranges. The chest radiograph showed diffuse patchy lung consolidation and hyperinflation (Figure 1). Results of an upper gastrointestinal tract barium study revealed no anatomic abnormality or evidence of reflux. However, results of a videofluoroscopic swallowing study revealed occasional silent microaspiration of only thin contrast liquid, resulting in the recommendation to avoid thin liquids. An echocardiogram was normal.

After several days of hospitalization without improvement in the patient’s tachypnea and retractions, the mother was asked specifically if the child had been given any oils. The mother answered that she had given the infant 1 capful of olive oil per day orally for fussiness beginning at about 1 week of age until 3 weeks of age, when he was hospitalized for the first time. She had not considered this to be a medical treatment. Her relatives had advised her that this “food” would calm the infant’s stomach.

Bronchoscopy and bronchoalveolar lavage (BAL) were performed with the infant under anesthesia in concert with high-resolution computed tomography (CT) of the chest. Bronchoscopy findings revealed normal anatomy, and BAL yielded lipid-laden macrophages for which oil red O stain testing was positive (only qualitative staining was performed). Gram stain of BAL fluid showed few white blood cells, predominantly polymorphonuclear lymphocytes and mononuclear cells, and moderate gram-negative cocci. Bronchoalveolar lavage cultures later yielded abundant Branhamella catarrhalis but no other bacteria, fungi, or viruses. High-resolution CT findings showed dependent, bilateral lung consolidation with areas of low attenuation (−70 to −20 Hounsfield units, similar to subcutaneous fat) and geographic areas of smooth interlobular septal thickening with superimposed ground-glass opacity (crazy-paving pattern) (Figure 2). The diagnosis of exogeneous lipid pneumonia was made on the basis of the constellation of clinical, radiographic, and histologic findings. The infant’s respiratory status improved with intravenous cefuroxime sodium therapy and nasogastric tube feeding. At the time of discharge, the mother was willing to believe that the infant’s problems might be due to oil aspiration, but she expressed some doubts. Nevertheless, she agreed to discontinue the olive oil treatments. He continued to receive nasogastric

Figure 1. Anteroposterior (A) and lateral (B) chest radiographs show bilateral perihilar patchy consolidation and large lung volume. A small amount of barium is present in the stomach from recent upper gastrointestinal tract examination.
bolus feedings of breast milk supplemented with starch
for 1 month, followed by thickened feedings for 5 months,
when a follow-up videofluoroscopic swallowing study
demonstrated no aspiration.

The patient was followed up closely after discharge. He was seen and treated with antibiotics once more for pneumonia, 2 weeks after discharge, but his respiratory examination findings were judged to be steadily improving otherwise. At follow-up 7 months after discharge, the infant’s respiratory rate had decreased to 45 breaths/min and he had no retractions. Auscultation indicated a clear chest and normal expiratory phase. His mother agreed that his respiratory status had improved markedly since discharge, and she was now certain that the oil had been responsible for the infant’s respiratory symptoms.

PATIENT 2

A Mexican American male infant presented at 4 months of age to our institution for evaluation of poor growth and a 2-month history of persistent tachypnea and patchy lung consolidation with hyperinflation on chest radiographs. His medical history was remarkable for pneumonia, which was diagnosed at 2 months of age after a 3-week history of persistent nasal discharge and 3 days of nocturnal cough. He was hospitalized for 3 days and treated with intravenous cefuroxime sodium and erythromycin lactobionate. Results of blood cultures and tests for respiratory syncytial virus and Chlamydia species were negative; results of a complete blood cell count were unremarkable. Treatment was completed with a course of oral amoxicillin and erythromycin. Subsequent chest radiographs showed no change in the patchy lung consolidation. He presented once again after 2 months with persistent tachypnea.

Review of systems was remarkable for poor weight gain. He was a slow feeder, with difficulty swallowing, frequent spitting up, and routine tiring early with feedings. Bowel movements were normal. He was primarily breastfed, and received supplementation with iron-fortified formula. The infant was tachypneic, and the mother noted that he had an occasional nocturnal cough and intermittent nasal congestion since the first month of life. The family had recently emigrated from Mexico but he had not been outside the United States. He had no exposure to pets or mold. He had received his 2-month immunizations. The family history was remarkable for the mother having a positive purified protein derivative test reaction and a cough. His sister had died of nephrotic syndrome secondary to congenital cytomegalovirus infection.

On physical examination, the infant had a respiratory rate of 86 breaths/min, was afebrile, and had a pulse rate of 124 beats/min. His weight was less than the fifth percentile (a decrease from the 25th percentile at birth). He appeared thin, but was awake and alert. Although he was tachypneic, breathing was unlabored and the chest was clear to auscultation. Cardiac examination results were normal. A soft liver edge was palpated 2 cm below the right costal margin, but the spleen was not palpable. The extremities were pink and well perfused without clubbing or edema.

An admission chest radiograph showed patchy consolidation in the right upper, right lower, and left upper lobes (Figure 3). Results of laboratory studies, including measurement of serum bicarbonate and albumin levels and complete blood cell count, were normal. Results of an upper gastrointestinal tract barium study were normal, with no evidence of reflux. Results of a videofluoroscopic swallowing study showed no aspiration but a risk for aspiration with thin liquids that was based on the observation of a dyscoordinated swallow. He had no reaction to a purified protein derivative test, and 3 morning gastric aspirate samples were negative for acid-fast bacteria. Results of a sweat chloride test were normal.

On further questioning, the mother finally revealed that she had been administering oil drops into the infant’s nasal passages to help decrease his nasal discharge. She had been doing this since 1 month of age, when his first upper respiratory tract symptoms developed. She did not consider this a medication, and so had not volunteered it as part of the medical history. This exposure was considered to be the reason for the patient’s symptoms.

Figure 2. One-millimeter axial images from high-resolution computed tomography of the chest. A, Soft tissue window image shows bilateral dependent lung consolidation with focal areas of low attenuation (arrows). B, Lung window image shows areas adjacent to consolidation with smooth interlobular septal thickening and superimposed ground-glass opacity (crazy-paving pattern [arrow]).
respiratory illness, and his mother stopped giving him oil. He was discharged without further treatment except for administration of thickened feedings, which was discontinued after 2 months.

The patient was followed up closely after discharge, and he had no significant respiratory illnesses in the interim. At follow-up 1 year later, the child had normal respiratory examination results, and a chest radiograph showed marked clearing of the lungs.

COMMENT

Oil treatments of various types are common home remedies in many cultures. Lipoid pneumonia due to traditional therapies using food-based fats such as olive oil and butter in children is well-documented in several parts of the world, including Saudi Arabia, southern India, Mexico, and Brazil. Other oils, including mineral oil and the shark derivative squalene, have also been reported as causes of lipoid pneumonia in children in western and Asian cultures. Although chronic aspiration of such nonvolatile oils is a recognized cause of respiratory pathology, acute lipoid pneumonia caused by the ingestion of kerosene and other volatile hydrocarbons has been more thoroughly studied.

Despite all of these useful descriptive studies, only rare documentation of the use of oils in infants in western hemisphere cultures could be found in the available literature, using the search terms lipoid pneumonia, lipid aspiration, and oil and examining the citations of the resulting articles in MEDLINE. One case series of lipoid pneumonia among children in Mexico described 16 infants who had received oils according to traditional habits for complaints such as “nasal constipation” or as a bowel laxative; most of these patients had been given olive oil, but the indication and method of administration were not described. Another extensive case series was published by Castañeda-Ramos and Ramos-Solano. This article described 68 patients, all from the Mexican state of Jalisco and mostly younger than 4 years, with lipoid pneumonia due to vegetable oils. Ninety percent of the patients in that series had received olive oil, and most received it orally, nearly always since infancy. Straining, colic, or other abdominal complaints were the reasons given for administration in 67% of the cases.

In the first patient described herein, the patient’s family came from the state of Oaxaca, Mexico. The mother stated that olive oil treatments had been given to her as an infant; in fact, she informed us, “everyone” used these treatments in infants and children in the area in which she grew up. The oil was commonly given intranasally for nasal congestion or by mouth for stomachache or fussiness, and until now she had not heard of it ever causing lung disorders. Furthermore, the use of olive oil for these indications was so commonplace that her family members had also given olive oil to the patient for fussiness without first discussing it with her.

Although no single diagnostic test result in this case is specific for lipoid pneumonia, the constellation of lipid-laden macrophages on BAL findings and low-attenuation lung consolidation and a crazy-paving pattern on high-resolution CT in the setting of oil administration is highly indicative of exogenous lipoid pneumonia. Generalized aspiration can produce a similar distribution of lung consolidation but would not result in CT findings of low-attenuation parenchyma or a crazy-paving pattern, as both of these are the result of lipid in the air space, decreasing the overall CT attenuation of a
given voxel. Therefore, descending aspiration and/or reflux in these cases, if present, was believed to be secondary to the increased work of breathing because of lipid pneumonia, contributing secondarily to the overall pathogenesis of the patients’ lung disease.

The judgment of whether these infants had reflux was based on a combination of clinical information and results of upper gastrointestinal tract and/or gastric emptying studies; more definitive testing, such as endoscopy or a pH probe, was not performed, potentially resulting in an underestimation of the contribution of reflux in each case. However, ranitidine therapy did not improve symptoms in patient 1, and symptoms improved without it in patient 2, arguing that reflux was not the primary process in either case.

In our clinic population of mainly Spanish-speaking immigrants from Mexico and Central and South America, we conducted a brief survey on the use of oils as home remedies for common ailments in children. Of the 30 parents we interviewed, 22 (73%) were familiar with the practice of administering olive oil to infants and children to cure common ailments. Abdominal complaints were the main reasons cited for the use of olive oil, including empacho (bloating) and constipation. From the group of parents knowledgeable about the use of olive oil, 8 (36%) had actually given it to their child at least once, and 4 of those had administered oil repeatedly. Of all parents who had given their child olive oil, 7 (88%) thought it was beneficial. Only 3 (10%) of all parents interviewed thought that oil administration to children could be harmful. After educating the interviewed parents on the potential harmful consequences of oil administration, none planned to give oil to their children in the future. Given the apparently widespread nature of olive oil administration to infants among this population, it is not yet clear why some infants are more likely than others to develop lung disease as a result. It is possible that infants with reflux or dysphagia, which would otherwise be clinically silent, are at higher risk for lipid pneumonia under such circumstances. This question awaits further study.

The clinical course, history, and high-resolution CT findings in these illustrative cases are characteristic. However, the symptoms of tachypnea and cough, along with the chest radiographic findings (patchy lung consolidation and hyperinflation) are nonspecific.8,11 Uncovering a history of hydrocarbon ingestion is important in determining the cause of the disease. Unfortunately, as in these cases, the practices that lead to lipid pneumonia are rarely considered by caregivers to be treatments or necessary.

One interesting feature of the first case is the growth of B catarrhalis from BAL culture. Many types of bacteria have been identified as present in the lungs of patients and experimental animals with lipid pneumonia, such as atypical mycobacteria.9,6,12,16,17 However, it is unclear whether the presence of B catarrhalis is of clinical importance in this case, or whether it simply represents growth by another opportunistic pathogen in the setting of impaired mucociliary transport and cough reflex, as has been documented in humans and animals given mineral oil.1 Although the BAL results cannot absolutely distinguish between colonization and infection, it was believed that the abundance of bacteria in this case was in excess of that expected for colonization.

Case reports describe successful treatment of lipid pneumonias with corticosteroids.13,14 However, a double-blind, controlled pediatric trial for corticosteroid treatment of lipid pneumonia found no benefit.9 Therefore, treatment is primarily supportive, with antibiotics for secondary infection as indicated and oxygen as needed.

Although both patients presented with findings suggestive of aspiration, the role of lipid administration escaped detection for months. In the first case, this was in part owing to the widespread use of olive oil as a traditional therapy in the parents’ area of origin; they had previously believed this to be an innocuous and universal practice and understandably did not offer information about it. This underscores the need to ask questions directly about the use of lipids in patients with respiratory distress in whom aspiration may be a factor. The use of oils for traditional therapies has been documented in Latin American and other cultures, and it may well be more common than has been previously appreciated. The prevalence of these practices also justifies anticipatory education by health care professionals, who can counsel caregivers of young children to avoid oil administration to prevent potential cases of lipid pneumonia.

Accepted for Publication: May 5, 2005.
Correspondence: Lucas R. Hoffman, MD, PhD, Division of Pulmonology, Department of Pediatrics, Children’s Hospital and Regional Medical Center, Box 3D-4, 4800 Sand Point Way NE, Seattle, WA 98105 (lhoffm@uwashington.edu).

Author Contributions: Drs Hoffman and Yen had full access to all the data in the study and contributed equally to this article, and are thus joint first authors. As such, they take responsibility for the integrity of the data and the accuracy of the data analysis.

Funding/Support: This study was supported by grants from the North American Cystic Fibrosis Foundation and the National Institutes of Health, Bethesda, Md.

Acknowledgment: We thank Raj Kapur, MD, PhD, for his kind assistance in preparing this report.

REFERENCES


Once I asked Bill why Merced’s doctors never seemed to ask their Hmong patients how they treated their illnesses, and he replied that because the Hmong dressed at least approximately in American clothes, had driver’s licenses, and shopped in supermarkets, it never occurred to his colleagues—and only rarely to him—that they might practice esoteric healing arts.

—Anne Fadiman

author of

The Spirit Catches You and You
Fall Down