Case Report

Propionibacterium acnes

A cause of pneumatocele – associated pneumonia

Abdulrahman M. Al-Mazrou, *MBBS, FRCPC.*

ABSTRACT

Propionibacterium acne is a normal inhabitant of the skin and mucosal surfaces and is rarely identified as a cause of significant infection. Reports of chest infections by this organism are limited. We report a case of pneumatocele-associated pneumonia caused by this organism and review the literature.

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Propionibacterium acnes (*P. acnes*) is a gram-positive anaerobic bacillus that normally inhabits the skin and mucosal surfaces including the mouth, intestine, urethra and vagina,[1] and is traditionally considered a non-pathogenic isolate.[2] However, it has rarely been identified as the cause of significant infections in both adults[2] and children.[3] *Propionibacterium acnes* has been associated with infections involving blood,[4] central nervous system,[5-7] heart,[8] lungs,[9,10] surgical wounds,[11] joints[2] and other significant infections.[2,3] We describe a case of severe pneumonia complicated by pneumatocele formation caused by *P. acnes*.

Case Report. A previously healthy 22-month-old Saudi girl presented to the emergency department of King Khalid University Hospital, Riyadh, Kingdom of Saudi Arabia with a 4-day history of runny nose, fever, loose motion and cough; complete blood count (CBC) revealed a total white cell count (WBC) of 22 x 10^9/l and a neutrophil count of 18 x 10^9/l. A chest x-ray showed an infiltrate in the right lower zone, and a diagnosis of lobar pneumonia was entertained. A blood culture was collected, and the patient received a single injection of ceftriaxone 50 mg/kg intravenously and was sent home on oral cefuroxime. Two days later, she was re-admitted to the hospital due to progressive worsening of the fever and respiratory symptoms. At admission she was febrile (39°C), tachypneic (respiratory rate=58/mm), heart rate was 146/min, blood pressure was 94/55 mm Hg; oxygen saturation was 90% at room air and raised to 95% on 0.5 L/min oxygen. Chest examination revealed decreased breath sounds and dullness in the right side. The weight was 12 kg (>50th percentile) and the height 88 cm (>75th percentile). The total leukocyte count was 32 x 10^9/l with 27 x 10^9/l neutrophil; erythrocyte sedimentation rate (ESR) was 105. Nasopharyngeal aspirate was positive for respiratory syncytial virus and negative for influenza A, B, adenovirus, and para-influenza 1, 2, 3 antigens by immune florescent. Blood culture was carried out twice and was sterile. Chest x-ray at admission showed pneumonic consolidation in the right side

From the Department of Pediatrics (39), King Saud University, Riyadh, *Kingdom of Saudi Arabia.*

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Address correspondence and reprint request to: Dr. Abdulrahman M. Al-Mazrou, Department of Pediatrics (39), Associate Professor and Consultant of Pediatrics and Infectious Diseases, College of Medicine, King Saud University, PO Box 2925, Riyadh 11461, *Kingdom of Saudi Arabia.* Tel. +966 (1) 4670878. Fax. +966 (1) 4672650. E-mail: almazrou@ksu.edu.sa / Pedia_ID@yahoo.com

with pleural effusion **(Figure 1).** The patient received parenteral cefuroxime for the first 2 days following admission but showed no improvement. A chest computed tomography scan was carried out on the third day and showed consolidated right lower lobe with necrotizing pneumonia and collapsed right upper lobe and right-sided pleural effusion. A pleural tap was performed under ultrasound guidance and the aspirated pus was directly inoculated in a blood culture bottle. The gram stain showed many pus cells and many gram positive bacilli; therefore, the antibiotic coverage was changed to ceftriaxone and clindamycin. Subsequently, the cultured pleural fluid grew a diphtheroid-like anaerobic bacillus, which was identified as *P. acnes* by API system (Bio Merieux, France). It was sensitive to penicillin and ceftriaxone but resistant to metronidazole and clindamycin. The later was discontinued and therapy was completed with ceftriaxone for a total of 21 days. A repeat pleural tap 3 days later showed WBC 432/mm^3, 68% lymphocytes, 32% neutrophil, RBC 54,000/mm^3, total proteins 43 g/L, glucose 0.3 mmol/L, lactate dehydrogenase 4294 u/L (180-430); and the gram stain was negative and culture was sterile. The chest x-ray on day 10 of admission revealed improvement of the consolidated patch with the appearance of several well-defined air-filled cysts in the right lower zone consistent with pneumatoceles **(Figure 2)**. The patient showed a gradual improvement, and by day 9 of admission she was afebrile, not tachypneic and off-oxygen supplement. On day 16 following admission CBC was normal, and chest x-ray showed no progression of the size of the pneumatoceles. The patient was discharged from the hospital after completion of 3 weeks of ceftriaxone therapy. When she was seen in follow-up 7 weeks after discharge, she was well clinically with normal chest examination, normal CBC and normal ESR; the chest x-ray has returned to normal with resolution of the pneumatoceles **(Figure 3)**. Her course on subsequent follow-up was uneventful and at her last follow-up 3 years following the discharge, she has remained well, with normal growth and development.

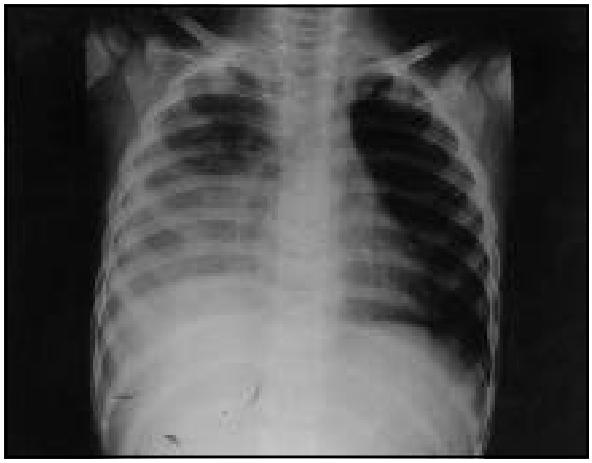

Figure 1 - Chest x-ray at admission showing right-sided consolidation and pleural effusion.

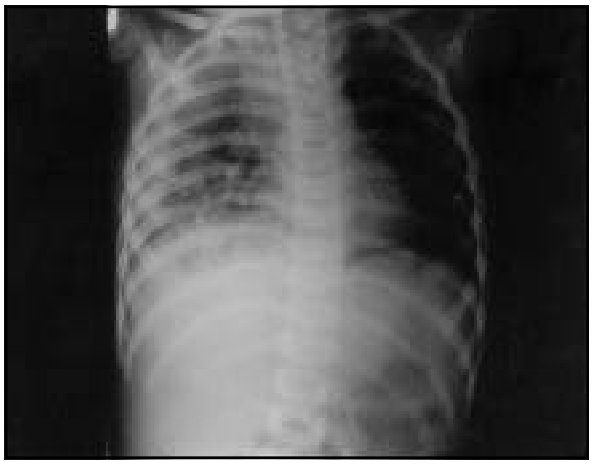

Figure 2 - Multiple pneumatoceles in the right lung with resolution of consolidation.

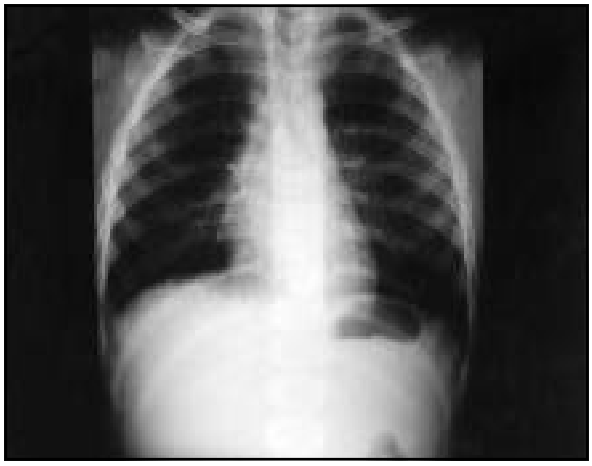

Figure 3 - Chest x-ray 7 weeks following discharge showing complete resolution of pneumatoceles.

Discussion. Although an unusual pathogen, *P. acnes* has been identified as the etiology of variable serious infections including sepsis,[4] endocarditis[8] meningitis,[6] subdural empyema;[7] epidural abscess,[5] and so forth.[2,3] Reports of pulmonary infections due to *P. acnes* are scarce. In a report of infections caused by *Propionibacterium* species (mostly *P. acnes*) over 10 years, Brook and Frazies[2] identified 94 instances of true infections and only 3 were involving the chest.[2] Two of the 3 were related to placement of drainage chest tubes, and one patient followed a diagnostic surgery.[2] In a study of

Propionibacterium infections in children, 89% were caused by *P. acnes*.[3] Although the study was conducted over 15 years, non of the 50 isolates representing true infections, was involving the chest.[3] Bourdeaut et al,[10] reported 2 patients with *P. acnes* chest infection.[10] Both patients were known to have chronic granulomatous disease. One of them developed a mediastinal abscess, and the other middle lobe pneumonia caused by *P. acnes*.[10] Claeys et al[9] described a sub-acute lung infection in an elderly patient with chronic lung disease on steroid therapy, whose open lung biopsy implicated *P. acnes* as the causative agent.[9] In contrast to these reports of pulmonary infections caused by *P. acnes*, our patient has no chronic lung disease,[9] foreign body placement, or surgery as predisposing factors.[2]

Pneumatocele formation has been recognized as a complication of pneumonia caused by certain microorganisms including *Staphylococcus aureus, Klebsiella sp*. as well as other known pathogens.[12,13] In a study of pneumatoceles in infants and children, Amitai et al,[13] identified the causative pathogen in 8 of 12 cases with pneumatoceles. The pathogens were *Haemophilus influenzae, Pseudomonas aeroginosa, Staphylococcus aureas, Klebsiella pneumoniae and Streptococcus pneumoniae.* Oviawe and Ogundipe[12] in a review of 127 cases of pneumatoceles associated with pneumonia in Nigerian children, found bacterial etiology in 53 cases.[12] *Staphylococcus aureus* was associated with two–thirds of the cases and the rest was caused by other usual pathogenic organisms similar to the previous study. Of interest, one of the identified cases was microaerophilic *Streptococcus*.[12] *Propionibacterium acnes* was not identified in either series.[12,13]

Since *P. acnes* is part of the normal flora, contamination of clinical specimens is a potential problem causing difficulty in interpreting the significance of the isolation.[2,3] In our case, however, this is an unlikely event since the organism was isolated in pure culture from a normally sterile body site and was present in large numbers on gram stain. Furthermore, the patient did not have acne, and at her age *P. acnes* is not expected to colonize the skin. The procedure was carried out under full aseptic technique.

In conclusion, *P. acnes* was identified as a cause of significant pneumonia complicated by formation of pneumatoceles. It should be considered as a potential etiology of such infection and should not simply be disregarded as a contaminant.

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