Pseudomonas thoracic empyema secondary to nosocomial rhinosinusitis

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ABSTRACT: Three cases of Pseudomonas thoracic empyema occurring in nasotracheally intubated patients are reported. Rhinosinusitis, a well-documented complication of prolonged nasotracheal intubation, could be the primary infectious location. Massive respiratory tract colonization leads to extensive necrotizing pulmonary lesions. Failure of diagnosis and treatment of sinus involvement could be responsible for persistent or recurrent pleural empyema. Treatment includes continuous pleural drainage, sinusitis treatment and antibiotics. This complication should be considered in the choice between early tracheostomy and prolonged nasotracheal intubation in Intensive Care Unit (ICU) patients.

Keywords: Nasotracheal intubation; sinusitis pyopneumothorax.

Received July 1, 1987; accepted after revision March 28, 1988.

Case 1

A 33 yr old man was admitted to the medical ICU with severe pleuropneumonia and Streptococcus pneumoniae septicemia. He needed nasotracheal intubation and intermittent positive pressure ventilation (IPPV) associated with high dose penicillin sodium therapy. Six days later he remained febrile in spite of sterile cultures from blood samples, pleural aspirate and sputum. No clinical evidence for a septic process could be found. On the eighth day a computed tomography (CT) scan demonstrated air-fluid levels in the sphenoid, ethmoid and left maxillary sinuses. A transnasal needle puncture of the left maxillary sinus and a tracheostomy were performed. On the tenth day a pyopneumothorax developed requiring continuous suction drainage. Culture specimens from blood, sputum, sinus aspirate and pleural effusion all grew Pseudomonas aeruginosa. The septic course progressively improved with cefazidime and amikacin therapy. Six weeks of thoracic drainage was needed. Two months after admission the patient made a full recovery.

Case 2

A 73 yr old woman had massive pulmonary haemorrhage due to acute systemic lupus erythematosus. An acute respiratory failure was treated with corticosteroid therapy and continuous positive pressure ventilation after left nasotracheal intubation. Sputum specimens and blood samples grew Streptococcus pneumoniae. High dose penicillin sodium was added to the treatment and the patient became afebrile. On the eighth day a CT-scan demonstrated bilateral ethmoid and maxillary sinus involvement. A transnasal needle aspiration and a tracheostomy were performed. On the ninth day a new septic course developed. Under a high level of positive end-expiratory pressure (PEEP), a compressive pyopneumothorax developed requiring emergency drainage. The patient died a few hours later. Sinus aspirate, pleural effusion and sputum cultures grew Pseudomonas aeruginosa.

Case 3

A 45 yr old man was admitted with Streptococcus pneumoniae septicemia and pleuropneumonia. An acute respiratory failure developed, and IPPV was instituted after nasotracheal intubation. Cultures from blood, sputum and pleural effusion grew Streptococcus pneumoniae. After six days of treatment by pleural suction drainage and high dose penicillin sodium, all cultures were negative. Eight days after admission, in spite of respiratory status improvement, a new septic
course developed. A CT-scan demonstrated maxillary and ethmoid sinusitis on the side of the nasotracheal tube. A needle transnasal sinus aspiration was performed. Respiratory stabilization allowed nasotracheal tube removal. Sinus aspirate, pleural effusion and blood samples grew Pseudomonas aeruginosa, and penicillin was changed to ceftazidim and amikacin. In spite of adequate drainage of the pyopneumothorax, and antimicrobial chemotherapy, the septic course did not improve. Cultures remained positive for Pseudomonas and a new CT-scan showed no change in rhinosinusitis. A surgical drainage of the left maxillary sinus was performed. The situation then slowly improved: a CT-scan on the fiftieth day showing normal sinuses. Continuous suction drainage in front of a massive bronchopleural fistula was maintained for twelve weeks in association with antibiotics. Four months after admission the patient was able to be discharged.

**Comments**

Pseudomonas empyema is a life-threatening situation. In patients with prolonged nasotracheal intubation, paranasal sinusitis should be considered as a possible source of bronchopleural infection.

Paranasal nosocomial sinusitis is a well-documented complication of prolonged nasotracheal intubation [2-4]. Pseudomonas is responsible for 35% [4] to 48% [2] of the cases, especially among patients treated with prior antibiotic regimens and corticosteroids. The diagnosis must be considered in the event of unexplained fever and/or purulent nasal discharge [2, 5]. The extent of disease is best seen in CT-scans. Ethmoid and sphenoid involvement associated with maxillary sinusitis are frequent [2, 4].

Active Pseudomonas multiplication in an obstructed sinus leads to massive pharyngeal colonization. Pleuropneumonia related to the same pathogen is noted in 50% of the patients presenting with nosocomial sinusitis [4, 6]. Delay in diagnosis and treatment of the sinusitis leads to persistent pneumonia even with adequate antimicrobial agents. Mechanical ventilation, especially with high levels of PEEP, leads to ruptures of necrotic cavities.

Recovery from sinusitis can be obtained by sinus drainage. Removal of the nasotracheal tube, releasing obstruction, will permit adequate drainage and resolution of the problem within 48 h [4]. Persistent sinus obstruction should be treated by surgical drainage [3], and antibiotics. Ceftazidim could be chosen for its low minimal inhibitory concentration (MIC) [7], alone or associated with an aminoglycoside [8].

The prognosis of pseudomonas empyema depends on the underlying pulmonary lesions and primary disease. Mortality rate varies from 41% [1] to 80% when massive necrotizing lesions or septicemia are associated [9].

**References**


RÉSUMÉ: Trois cas d'empyème thoracique à Pseudomonas, développés chez des patients sous intubation naso-trachéale, font l'objet de cette publication. La rhino-sinusite para-masale, complication actuellement bien documentée des intubations naso-trachéales prolongées, pourrait être la localisation infectieuse primaire. La colonisation massive de l’arbre respiratoire entraîne des lésions pulmonaires nécrosantes extensives. C'est sans doute en raison du manque de diagnostic et de traitement de l'atteinte sinusale, que l’empyème pleural persistant ou récidivant s’est développé. Le traitement a combiné un drainage pleural continu, le traitement de la sinusite et l'administration d'antibiotiques. Cette complication doit être prise en compte dans le choix entre trachéostomie précoce et intubation naso-trachéale prolongée chez les patients dans les services de soins intensifs.