

Pneumonia, still a challenge for the pediatrician – Case report

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ABSTRACT

Pneumonia represents an inflammation of the pulmonary parenchyma that despite the multiple antibiotic classes available and despite the medical progresses, still leads to an increased mortality rate, especially in children. *Delftia acidovorans* and *Stenotrophomonas maltophilia* are Gram-negative bacilli that can lead to respiratory infections. We present the case of a 2 years and 3-month old male patient, admitted in our clinic for the following reasons: productive cough, fever and loss of appetite. Based on the clinical exam, laboratory and paraclinical investigations, we established the diagnosis of right pneumonia associated with pleural effusion and we administered wide spectrum antibiotics. Nevertheless, the evolution was unfavorable, needing pleurotomy and drainage. From the pleural fluid, there were isolated two strains of bacteria, *Delftia acidovorans* and *Stenotrophomonas maltophilia*. We adjusted the antibiotic regimen according to antibiogram, with afterwards slowly favorable evolution. The particularity of the case consists in diagnosing a pneumonia with pleural effusion in a 2 years and 3-month-old child, without risk factors, who needed pleurotomy with thoracic drainage, in whom the pleural fluid revealed 2 germs usually encountered in immunocompromised individuals, with favorable evolution after the initiation of antibiotics regimen according to the antibiogram.

Keywords: pneumonia, child, pleural effusion, *Delftia acidovorans*, *Stenotrophomonas maltophilia*

INTRODUCTION

Respiratory tract infections are some of the most frequent pathologies encountered in the medical practice, divided according to the location in upper and lower respiratory tract infection. Most of them are mild forms, sometimes self-limiting, therefore they are many times neglected (1). Pneumonia is a part of the lower respiratory tract infections and it represents the inflammation of the pulmonary parenchyma that, without treatment, can lead to different complications, such as meta- or parapneumonic

pleural effusion, lung abscess, abscedation with pleural empyema, that many times can be fatal.

Delftia acidovorans, formerly named *Comamonas acidovorans* or *Pseudomonas acidovorans* is an aerobe, Gram-negative, non-fermentative, mobile bacillus, with flagella at one or both poles (2). This bacillus is ubiquitous, being frequently encountered in soil, water and the hospital environment, and can affect both immunocompromised and immunocompetent individuals (3). *Delftia acidovorans* can be isolated from the respiratory tract, eye and blood, but it presents rarely a clinical relevance (4). Nevertheless, in

immunocompromised patients, with neutropenia, this bacillus can cause infections with major clinical impact (3). Even though aminoglycosides represent the first choice antibiotic class used against Gram-negative germs infections, *Delftia acidovorans* is frequently resistant to these type of antibiotics (5), therefore its isolation is essential in order to administer a targeted therapy with antibiotics.

Stenotrophomonas maltophilia, previously named *Pseudomonas maltophilia*, is an aerobe, Gram-negative, ubiquitous, multi-drug resistant germ (6). Most of the times, *Stenotrophomonas maltophilia* is present in potable water, with an increased risk of infection especially for immunocompromised individuals (6). This pathogen is most of the time associated with respiratory tract infections in human beings, but it can also cause eye infections, endocarditis, biliary sepsis, bones and joints infections, urinary tract infections and also meningitis (6). Most of the patients with infections due to *Stenotrophomonas maltophilia* are patients with comorbidities, like neoplasia, pulmonary chronic disorders or immunosuppression (6). The treatment of infections caused by *Stenotrophomonas maltophilia* is very difficult due to both its intrinsic multi-drug resistance and also its ability to develop resistance during antibiotic treatment (7,8). Nevertheless, fluoroquinolones are the antibiotics used routinely in these patients (9). Due to their wide use, but also of antibiotics generally, the resistance of this Gram-negative bacillus becomes higher and higher, causing more and more severe nosocomial infections, most of them life-threatening. Therefore, the isolation of this bacteria owns a major role in the management of patients with different infections caused by *Stenotrophomonas maltophilia*.

CASE PRESENTATION

We present the case of a 2 years and 3-month-old male patient that was admitted in our clinic with productive cough, loss of appetite and fever for approximately 5 days. The family history was

not relevant for the actual pathology. From his personal history, we found out that at the age of 1 year, the patient presented an episode of community-acquired pneumonia, probably a bacterial one, solved with ambulatory treatment. The onset of the actual pathology was approximately 5 days before the admission with fever, productive cough and loss of appetite, reasons for which the general practitioner recommends antibiotic (a 2nd generation cephalosporin) due to the persistence of fever and symptomatic treatment, but without the remission of symptoms. Therefore, he was admitted in our clinic for specialized investigations and treatment.

The clinical exam performed at the time of admission pointed out the following pathological elements: altered general status, fever (38.7 °C), ailing face, pale and warm skin, hyperemic pharynx and tonsils, productive cough, diminished vesicular murmur on the right side, crackles disseminated on the entire area of the right lung, mild tachycardia (100 beats/minute), weight of 12 kg. The laboratory tests performed on the day of admission revealed the following: mild leukocytosis with neutrophilia (Leu 10,980/mm³, Neu 7,990/mm³), anemia (Hb 11 g/l), increased transaminases (AST 94.4 U/L, ALT 110.2 U/L), increased erythrocyte sedimentation rate (ESR 120 mm/h), C reactive protein above the normal limit (CRP 35 mg/l). The peripheral smear proved a left deviation with the predominance of segmented cells (74%), but also the presence of toxic granulations and vacuoles inside the polymorphonuclear cells. We also performed imagistic investigations. Thus, the abdominal ultrasound revealed a minimum quantity of fluid collection in the right costo-diaphragmatic sinus. The thoracic radiography showed multiple opaque lesions of the middle and inferior lobes of the right lung and secluded pleural effusion at the level of the right oblique fissure (Fig. 1).

On the second day of admission, we also performed a thoracic CT exam that pointed out a right pleural effusion with a thickness of



Figure 1. Radiological aspect of the right lung at the time of admission

approximately 18 mm, secluded nearby the heart and at the level of the lateral and basal part of the right middle lung lobe. Therefore, we established the diagnosis of right community-acquired bacterial pneumonia associated with right pleural effusion and hepatocytolysis syndrome. The differential diagnosis included: pulmonary expansive processes (excluded based on the CT exam), foreign body/gastric content aspiration (excluded based on the anamnesis and paraclinical investigations), pneumonias of other etiology (excluded based on the imagistic investigations and the culture from the pleural fluid), pulmonary embolism (excluded based on the clinical picture and paraclinical investigations), pulmonary edema (excluded based on the clinical exam and the imagistic investigations), bronchiectasis with abscess (excluded based on the anamnesis and imagistic investigations and hydatid cyst (excluded based on the laboratory tests, imagistic investigations and the culture from the pleural fluid). Thus, we initiated antibiotic treatment with Meropenem 240 mg 3 times a day and Teicoplanin

120 mg 2 times a day for 4 days and symptomatic treatment, namely: antipyretics, analgesics, liver protectors and gastric protectors, but also probiotics. Nevertheless, the evolution was unfavorable due to the persistence of fever and altered general status, therefore pleurotomy and thoracic drainage were performed on the 5th day of admission. The bacteriological exam from the pleural fluid pointed out multiple leukocytes, most of them granulocytes with toxic granulations, but also erythrocytes. The culture identified two strains of germs: *Delftia acidovorans*, sensitive to most of cephalosporin, and *Stenotrophomonas maltophilia*, sensitive to Trimethoprim/Sulfamethoxazole and Levofloxacin. Therefore, the antibiotic regimen was modified according to the antibiogram with Ceftazidime 600 mg 2 times a day and Levofloxacin 120 mg 2 times a day for seventeen days, associating also an antifungal drug for five days, Fluconazole 70 mg on the first day and on the following 4 days 35 mg. The afterwards evolution was slowly favorable, with the progressive remission of fever and improvement of general status, the drainage tube being removed in the 15th day of admission. The antibiotic treatment was continued for a period of 21 days, with the normalization of laboratory tests. Before discharging the patient, we repeated the thoracic radiography pointing out right pachypleuritis. The patient was discharged with the recommendation to continue the liver protectors for one month and to present in the emergency room in case of symptoms suggesting a pneumonia (Fig. 2).

The particularity of the case consists in diagnosing a community-acquired, bacterial pneumonia with pleural effusion in a 2 years and 3-month-old child, that lived in a favorable environment, needing pleurotomy with thoracic drainage. The culture from the pleural fluid revealed two strains of bacteria, usually encountered in immunocompromised individuals, with favorable evolution after the initiation of antibiotics regimen according to the antibiogram.



Figure 2. Radiological aspect of the right lung at the time of discharge

DISCUSSIONS

Lower respiratory tract infections are one of the main leading causes of mortality and morbidity world-wide (10). Respiratory tract infections cause 34.6% death in South-East Asia, out of a total of 3,941,000 death in the entire world (11). The etiology of these infections vary with the age, gender, season, individual particularities of the immunological status, but also depend on other factors (12). Even though the etiology of respiratory tract infections can't be determined clinically, depending on the above mentioned factors, the physician can be guided towards a certain possible etiology in order to administer an antibiotic therapy as targeted as possible until the isolation of the causing agent, whenever it is possible.

Delftia acidovorans is a Gram-negative, ubiquitous bacillus that can cause respiratory tract infections, affecting both immunocompetent and immunocompromised individuals (3). Even though the incidence is rare and the clinical

relevance is not significant in most of the cases, this bacterium can cause severe infections in immunocompromised patients (neoplastic disorders, renal chronic disease, HIV/AIDS, patients on immunosuppressant drugs) (13). Despite the severity and the slowly favorable evolution, in case of the patient presented above, we did not identify any clinical or paraclinical sign of compromised immunological status. A recent study performed in a unit of intensive care from Brazil, 24 strains of *Delftia acidovorans* were isolated in 21 patients, obtained by tracheal aspirate, but it was not possible to determine the clinical relevance of this bacteria due to the lack of clinical data and the possibility to follow these patients (14). Of the 24 strains, none was sensitive to polymixin B, amikacin, gentamicin or tobramycin, and fluoroquinolones and trimethoprim/sulfamethoxazole presented variable activity against the isolated strains (14). The evolution of the respiratory infections determined by this Gram-negative bacillus is unpredictable in case of immunocompromised patients, but also in case of immunocompetent ones. Thus, Khan et al described the case of a 4-year-old immunocompetent child that was diagnosed with empyema determined by *Delftia acidovorans*. Despite the administered antibiotic treatment according to the antibiogram, the patient did not survive (15). Chun et al reported also a case of chronic empyema determined by *Delftia acidovorans* in an adult immunocompetent patient (16). Fortunately, our patient presented favorable evolution after the antibiotic treatment according to the antibiogram.

Stenotrophomonas maltophilia, an opportunistic Gram-negative bacillus, is an important causing agent of nosocomial infections, but not only, in immunocompromised individuals (17). The factors that predispose to an infection with *Stenotrophomonas maltophilia* are: the presence of central venous catheters, urinary catheters, mechanical ventilation, neoplasia, recent surgery, admission in an intensive care unit, immuno-

suppressant therapy, neutropenia, but also the recent use of antibiotics (18,19). None of these factors was identified in the case of the patient described above. This bacillus presents multiple defense mechanism and has developed resistance against multiple antibiotic classes, including carbapenemes. The wide use of antibiotics made this agent a predominant nosocomial pathogen (20). Nevertheless, trimethoprim/sulfamethoxazole is the first choice treatment for infections caused by *Stenotrophomonas maltophilia*, and fluoroquinolones represent the alternative (21). Similarly to those mentioned above, despite the initial administration of an antibiotic from the carbapenemes class, the evolution of our patient was unfavorable, but once we introduced a fluoroquinolone, the symptomatology remitted progressively. Though, at the same time, continuous

use of fluoroquinolones will increase the spectrum of resistance to this class, therefore being mandatory that the physician uses judiciously the antibiotics, and as much as possible adjust the treatment according to the antibiogram.

CONCLUSIONS

Delftia acidovorans and *Stenotrophomonas maltophilia* are two Gram-negative germs that cause mainly respiratory tract infections. Nevertheless, the infections caused by both germs were described in both immunocompetent and immunocompromised individuals, but it seems that the severity is much higher in immunocompromised ones. The association between the two germs can determine a potentially fatal infection in children.

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