Scientific Research Publishing

Open Journal of Pediatrics, 2023, 13, 138-145
https://www.scirp.org/journal/ojped
ISSN Online: 2160-8776
ISSN Print: 2160-8741

Neonatal Pleuropulmonary Staphylococcal Disease: A Case Report

Fatima-Ezzahra Tahiri[1,2*], Oualid Assem[1,2], Fatiha Bennaoui[1,2], Nadia El Idrissi Slitine[1,2], Nabila Soraa[3], Fadl Marabih Rabou Maoulainine[1,2]

[1]Department of Neonatal Resuscitation, University Hospital Center Mohamed VI, Marrakech, Morocco
[2]Health, Childhood and Development Research Team, Faculty of Medicine, Cadi Ayyad University, Marrakech, Morocco
[3]Microbiology Department, University Hospital Center Mohamed VI, Marrakech, Morocco
Email: *fatimaezzahratahiri29@gmail.com

How to cite this paper: Tahiri, F.-E., Assem, O., Bennaoui, F., El Idrissi Slitine, N., Soraa, N. and Maoulainin, F.M.R. (2023) Neonatal Pleuropulmonary Staphylococcal Disease: A Case Report. *Open Journal of Pediatrics*, **13**, 138-145.
https://doi.org/10.4236/ojped.2023.131017

Received: December 8, 2022
Accepted: January 26, 2023
Published: January 29, 2023

Abstract

Staphylococcal pleuropulmonary disease (SPP) is the localization of pathogenic staphylococcal disease in the lung and pleura and its general haematogenic consequences. This location is not primary, but follows a primary skin or mucous infection that may go unnoticed. This is a very rare phenomenon in neonatology and in the various literature reviews. Through our observation we report the clinical diagnosis of a newborn 13-day age with pleuropulmonary staphyloccocia point of departure cutaneous, thus the paraclinical explorations performed in our patient therapeutic management and evolutionary profile after a 3-month decline. Note that the problem of resistance of staphylococci to different antibiotics is currently a real public health problem making the choice of treatment very difficult for the clinician.

Keywords

Newborn, Skin Infection, Respiratory Distress, Meticillin-Resistant Staphylococcus Aureus, Excavation, Pneumothorax

1. Introduction

Staphylococcal pleuropulmonary is a relatively common condition in infants, rare in newborns.

Despite the progress of pediatric resuscitation measures, this pathology remains formidable in developing countries.

It is a very worrying disease because of the toxicity of staphylococcus aureus, which can lead to a serious infectious shock, its necrotizing power, which causes mechanical complications, and especially because of the resistance of staphylo-

coccus aureus to various antibiotics [1] [2].

Staphylococcal remains a pathology exclusively of young infants, very rare in the newborn see exceptional which explains all the particularity of our observation.

Positive diagnosis and management in the new child is a real challenge for each clinician, especially since the scientific literature is of particular interest to infants and the older child.

2. Objective

To report the medical observation of a newborn baby hospitalized in the neonatal intensive care unit of university hospital center MOHAMMED VI MARRAKECH who presented a purulent cutaneous collection at the xiphoid level complicated by pleuropulmonary staphylococcus aureus with meningeal and hematogenous diffusion.

Interest: Rare entity in the neonatal period, with acute and sometimes chronic complications.

3. Medical Observation

Female newborn, 13 days old, premature at 34 weeks of amenorrhea and 2 days according to the ultrasound of the first trimester, from a first-degree related marriage, with no particular pathological history in the mother.

The newborn was initially hospitalized from birth for 3 days in our department for weak sucking reflex, having received parenteral nutrition by an intravenous route taken from the right hand, reeducation of the reflex by the finger and pacifier technique, rewarming with good evolution.

The patient was readmitted 10 days after her discharge for febrile respiratory distress associated with a purulent collection at the xiphoid level with liquid content measuring 3 cm in width, warm with an inflammatory aspect, and a refusal to suckle evolving for 5 days.

On admission, the newborn was hypotonic, dehydrated, febrile at 38.5 degrees, polypneic at 67 cycles/minute with signs of respiratory struggle such as moderate intercostal and subcutaneous draught. Pulmonary auscultation did not reveal any abnormalities.

The skin recoloration time was normal, no mottling, with a refusal to suckle.

The initial biological workup noted an infectious syndrome with white blood cells 18,700/ul, neutrophilic predominance at 10,050/ul with a platelet count of 132,000/ul, a C REACTIVE PROTEIN was 132.52 mg/l.

The puncture of the xiphoid collection showed a fetid purulent aspect with isolation of Meticillin-resistant Staphylococcus aureus in the bacteriological sample and in the blood culture.

In front of the refusal of suckling a lumbar puncture with study of the cerebrospinal fluid objectifying meningitis to staphylococcus aureus resistant to the Meticillin.

The patient was treated since her admission with vancomycin and amikacin

with good clinical and biological evolution.

As part of the investigation of the field, an immune deficiency assessment was performed in our patient, including HIV serology, which was negative, the dosage of lymphocyte subpopulations and complement was normal.

The initial chest X-ray showed an alveolar opacity of the right middle lobe (Figure 1).

A follow-up chest X-ray performed 8 days after antibiotic therapy revealed a right cavitary image related to the excavation of the initial opacity with a minimal pneumothorax on the left (Figure 2).

Chest X-ray performed after a 8-week follow-up showed clear radiological cleaning (Figure 3).

The evolution of our patient was favorable after 2 months, pleura-pulmonary examination was normal, disappearance of the xiphoid collection and good intake of its food ration.

The infectious check-up was negative.

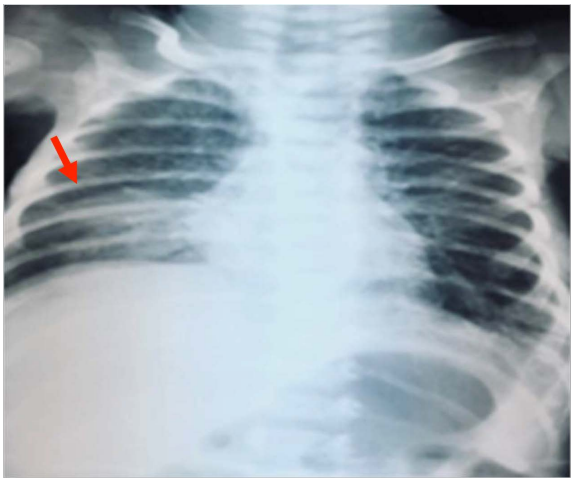

Figure 1. ADMISSION CHEST X-RAY. Alveolar opacity in the right middle lobe.

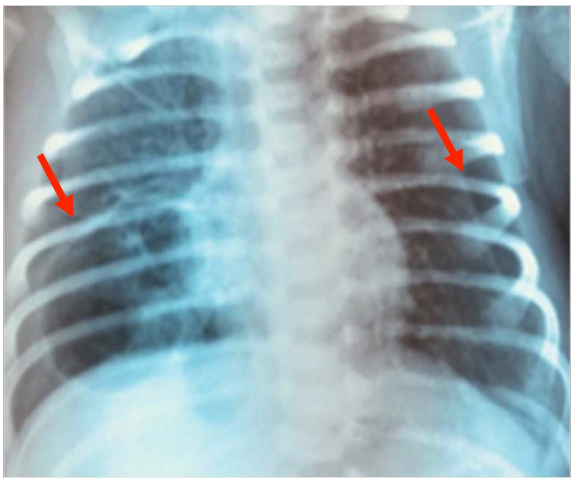

Figure 2. CONTROL CHEST X-RAY. In right cavitary image. Minimal pneumothorax on the left.

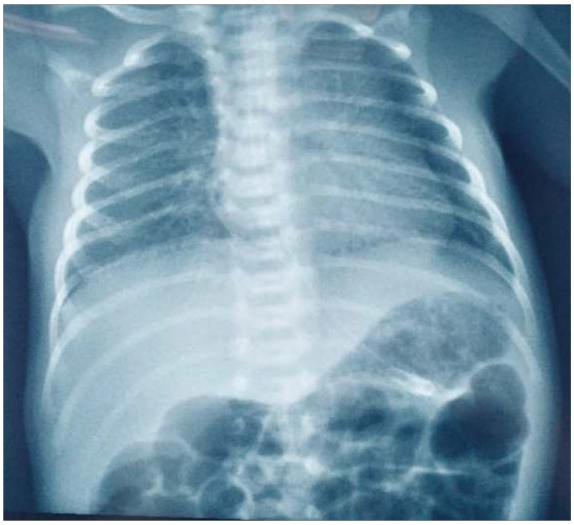

Figure 3. Cleaning of radiological anomalies.

4. Discussion

Pleuropulmonary staphylococcal disease is still the preserve of infants, accounting for 70% of children under one year of age [3]-[8], and is a fairly rare and serious condition in newborns.

Clinical manifestations are dominated by fever and rapid onset of respiratory signs [5] [6] [7] [8] [9].

Digestive symptoms, on the other hand, are often silent [5] [6]; when they are studied [3] [8] [9], their frequency is of the order of 50%; abdominal meteorism, often significant, is the best sign.

Clinical atypia in newborns is frequent, making the diagnosis difficult and often delayed.

The rapid evolution of the respiratory disease is reflected in the admission chest X-ray, which is very suggestive of the diagnosis: existence of a pleural effusion, often discreet (simple filling of a pleural sac), bullous images or even a pyopneumothorax.

The maximum delay between the first clinical signs and the radiological signs is 3 days [10] [11].

This is explained by the pathophysiology of the disease based on contamination through a cutaneous or mucosal lesion, a bacterial proliferation occurs with a localized thrombophlebitis. This will produce a pulmonary septic metastasis in the form of a furuncle with an inflammatory crown. This one will evolve from one step to the next. Pleural involvement may be via the lymphatic route from the parenchymal focus or directly via the hematogenous route [4].

Bacteriological evidence is most often provided by pleural samples, with blood cultures only rarely proving positive.

The germ most responsible is the staphylococcus (Staphylococcus aureus or Staphylococcus aureus), a gram-positive, immobile cocci with a grape-like or rarely small chain-like grouping.

According to the biochemical characteristics, a distinction is made between coagulase-positive staphylococci (SCP) and coagulase-negative staphylococci (SCN).

The different constituents of staphylococcus, namely the bacterial wall, exotoxins and exoenzymes, explain the pathogenic effects of staphylococcus. Thus, the staphylococcus has toxic, necrotic, dissemination and foreign material adhesion capacities.

To facilitate the diagnosis in infants, the combination of a general condition, respiratory signs and abdominal bloating in an infant is characteristic of pleuropulmonary staphylococcal disease and requires urgent hospital care.

Once the diagnosis of pleuropulmonary staphylococcal has been made, it is necessary to look for a cutaneous or mucous membrane entry point, which may be more than one month old, or for a staphylococcal focus in the surrounding environment, such as a breast abscess, panic attack, or other.

In newborns, however, the atypical clinical presentation makes clinical diagnosis very difficult.

For pleuropulmonary staphylococcal disease of non-hospital origin, Begue reports nearly 45% of resistant staphylococci in children in Togo and Saravolatz an increase from 3% to 38% between March 1980 and September 1981 [11].

The antibiotic therapy generally recommended combines: a penicillin M: Oxacillin or Meticillin at a rate of 150 to 200 mg/kg/day, the former having a lower minimum inhibitory concentration and causing fewer complications [12] [13] and an aminoglycoside.

From the 1980s onwards, this phenomenon of resistance accelerated, most markedly for strains of hospital origin, with percentages varying according to the nature of the services and the pathologies encountered [14], but exceeding 50% of staphylococcus aureus strains in most pediatric intensive care units [15] [16], and 60% to 74% of coagulase-negative staphylococcus strains [1] [17].

In the case of meticillin-resistant staphylococci, the most consistently active antibiotics are vancomycin [11] [18] [19] [20] [21] and rifampicin, whose minimal inhibitory concentration appears to be very low [18] [21] [22] [23] and whose tissue penetration is satisfactory [23].

The choice of antibiotic therapy is in any case based on the antibiogram of the germ and the study of the bactericidal power of the different combinations.

In our patient, the treatment was based on vancomycin for a period of 4 weeks in association with amikacin for 5 days with a good clinico-biological and radiological evolution.

The usual evolution was towards a cure without sequelae with normal respiratory function tests [24] [25] [26] [27], due to the resorption capacity of pachypleuritis in children [6] [28] [29].

The main prognostic factors found in the literature are: young age (the disease is more severe in the first 3 months of life), [6] [8], particularly in the first month with the risk of apnea [20], deterioration of the general condition on admission [9], leukopenia [5] [8] [20] [30] more than thrombocytopenia [9], ab-

sence of initial effective therapy on the strain in question [5] [8] [31] [32] [33] [34].

5. Conclusions

Pleuropulmonary staphylococcal disease in newborns is a rare condition with a variety of clinical and radiological presentations, and the prognosis in this age group remains poor.

The rapid increase in the percentage of meticillin-resistant strains is cause for concern, and the appropriateness of first-line antibiotic therapy with vancomycin and an aminoglycoside should be questioned.

The mortality of this disease remains high depending on the extent of the pulmonary lesions, hence the interest of an early and effective antibiotic therapy.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Qbaron, D., Drugeon, H.B. and Touze, M.D. (1987) Le Staphylocoque en 1987. *Maladies Infectieuses*, **37**, 21.

[2] Bellon, G. (1986) Pleuropulmonary Staphylococcal Disease in Infants. In: Gill, R. and Normand, J., Eds., *Coord Pneumologie*, Cardiologie, Paris, 21.

[3] El Mamoun, T.B. (1991) Staphylococci in Children in the Infectious Diseases Department of the Children's Hospital of Rabat. Abdelhamid Miri, Rabat.

[4] Alpert, G., Campos, J.M., Harris, M.C., Preblud, S.R. and Plotkin, S.A. (1984) Vancomycin Dosage in Pediatrics Reconsidered. *American Journal of Diseases of Children*, **138**, 20-22. https://doi.org/10.1001/archpedi.1984.02140390012005

[5] Caffey, J. (1940) Regional Obstructive Pulmonary Emphysema in Infants and in Children. *American Journal of Diseases of Children*, **60**, 586-605. https://doi.org/10.1001/archpedi.1940.02000030118011

[6] Jevons, M.P. (1961) "Celbenin"—Resistant Staphylococci. *British Medical Journal*, **1**, Article No. 124. https://doi.org/10.1136/bmj.1.5219.124-a

[7] Lepercq, G. and Leyne, M. (1972) Blowing during Pleuropulmonary Suppurations in Infants. *Annals of Pediatrics*, **19**, 43-48.

[8] Odio, C., McCracken Jr., G.H. and Nelson, J.D. (1984) Nephrotoxicity Associated with Vancomycln Aminoglycoside Therapy in Four Children. *Journal of Pediatrics*, **105**, 491-493. https://doi.org/10.1016/S0022-3476(84)80036-0

[9] Philips, M.R. and Milner, D.G. (1983) Clinical Pharmacology of Netilmicin in the Newborn. *Archives of Disease in Childhood*, **58**, 451-453. https://doi.org/10.1136/adc.58.6.451

[10] Lacut, J.Y. and Dupon M. (1982) Antibiotic Treatment of Staphylococcal Infections. *Revue du Praticien*, **32**, 3187-3199.

[11] Pryles, C.V. (1958) Staphylococcal Pneumonia in Infancy and Childhood: An Analysis of 24 Cases. *Pediatrics*, **21**, 609-623. https://doi.org/10.1542/peds.21.4.609

[12] Chanal, M., Roussane, M.C., Miermont, C., Cluzel, M. and Sirot, D. (1980) Activité

anti-bactérienne de la nétilmicine comparée avec d'autres aminosides. *Médecine et Maladies Infectieuses*, **10**, 327-333. https://doi.org/10.1016/S0399-077X(80)80087-4

[13] Chartrand, S.A. and McCracken Jr., G.H. (1982) Staphylococcal Pneumonia in Infants and Children. *Pediatric Infectious Disease Journal*, **1**, 19-23. https://doi.org/10.1097/00006454-198201000-00006

[14] Parker, R.H. and Fossieck Jr., B.E. (1980) Intravenous Followed by Oral Antimicrobial Therapy for Staphylococcal Endocarditis. *Annals of Internal Medicine*, **93**, 832-834. https://doi.org/10.7326/0003-4819-93-6-832

[15] Craven, D.E., Reed, C., Kollisch, N., *et al.* (1981) A Large Outbreak of Infections Caused by a Strain of *Staphylococcus aureus* Resistant to Oxacillin and Aminoglycosides. *The American Journal of Medicine*, **71**, 53-58. https://doi.org/10.1016/0002-9343(81)90258-8

[16] Estavoyer, J.M., Talon, D., Dupont, M.J., Bonin, P. and Michel-Briand, Y. (1984) Value of Rifampin in the Treatment of Staphylococcal Septicemia. *Pathologie Biologie*, **32**, 552-555. (In French)

[17] Estournet, B., Bataille, J. and Barois, A. (1985) Evolutiondes Infections Staphylococciques en Ranimation. *Rea. Soins int. Med*, **1**, 53.

[18] Fosse, T., *et al.* (1984) In Vitro Study of the Cefamandole-Fosfomycin Combination against Methicillin-Resistant Staphylococci. *Pathologie Biologie*, **32**, 528-531. (In French)

[19] Groff, D.B., Randolph, J.G. and Blades, B. (1984) Empyema in Childhood. *JAMA*, **195**, 572-574. https://doi.org/10.1001/jama.195.7.572

[20] Saint Martin, J. and Kachaner, J. (1969) Clinical Aspects and Therapeutic Possibilities of Severe Pleuropulmonary Staphylococci in Infants. *Journées Parisiennes de Pédiatrie*, **8**, 275-299.

[21] Lietman, P.S., Schaad, U.B., McCracken Jr., G.H. and Nelson, J.D. (1980) Clinical Pharmacology and Efficacy of Vancomycin in Pediatric Patients. *The Journal of Pediatrics*, **96**, 119-126. https://doi.org/10.1016/S0022-3476(80)80347-7

[22] Hendren, W.H. and Haggerty, R.J. (1958) Staphylococcal Pneumonia in Infancy and Childhood: Analysis of 75 Cases. *JAMA*, **168**, 6-16. https://doi.org/10.1001/jama.1958.03000010058003

[23] Henricksson, P., Svenningsen, N., Juhlin, I. and Haeger, K. (1980) Netilmicin in Moderate to Severe Infections in Newborns and Infants: A Study of Tolerance, Efficacy and Pharmacokinetics. *Scandinavian Journal of Infectious Diseases*, **23**, 155-159.

[24] Hieber, J.P., Nelson, A.J. and McCracken Jr., G.H. (1977) Acuteisseminated Staphylococcal Disease in Childhood. *American Journal of Diseases of Children*, **131**,181-185. https://doi.org/10.1001/archpedi.1977.02120150063012

[25] Jarvis, W.R., Thornsberry, C., Hughes, J.M., Boyce, J. and Haley, R.W. (1984) Methicillin-Resistant *Staphylococcus aureus* at Children's Hospitals in the United States. *Pediatric Research*, **18**, 278. https://doi.org/10.1203/00006450-198404001-01110

[26] Sorrell, T.C. and Packham, D.R. (1982) Vancomycin therapy for Methicillin-Resistant *Staphylococcus aureus*. *Annals of Internal Medicine*, **97**, 344-350. https://doi.org/10.7326/0003-4819-97-3-344

[27] Kanoff, A., Kramer, B. and Carnes, M. (1939) Staphylococcus Pneumonia: A Clinical, Pathologic, and Bacteriologic Study. *The Journal of Pediatrics*, **14**, 712-724. https://doi.org/10.1016/S0022-3476(39)80091-9

[28] Lepercq, G., Steinschneider, R., Saada, R. and Brocard, M. (1972) Pleuropulmonary Staphylococci in Infants. Normal Initial Radiological Aspects. *Annals of Pediatrics*, **19**, 35-41.

[29] Lamberz, J., Saint Martin, J., Lallemand, D. and Huault, G. (1971) Pleuro-Pulmonary Staphylococci of Acute Evolution of the Older Child. *Pliatrie*, **26**, 13-30.

[30] Maounis, F. and Niclopoulos, D. (1969) Staphylococcal Pneumonia in Infants. *Lancet*, **11**, 268. https://doi.org/10.1016/S0140-6736(69)90033-6

[31] McLaughlin, F.J., Goldmann, D.A., *et al.* (1984) Empyema in Children: Clinical Course and Long Term Follow-up. *Pediatrics*, **73**, 587-593. https://doi.org/10.1542/peds.73.5.587

[32] Bingene, M.E. (1984) Introduction des dosages de traitement paramikacine desinfections sévèreset germes multiresistants chez le nourrisson et l'enfant. Société francaise de pediatrie, Editions Flammarion, Paris, 438

[33] Miser, J.S. and Miser, A.W. (1980) *Staphylococcus aureus* Sepsis in Childhood Malignancy. *American Journal of Diseases of Children*, **134**, 831-833. https://doi.org/10.1001/archpedi.1980.02130210015005

[34] Noel, G.J. and Edelson, P.J. (1984) Staphylococcus Epidermidis Bacteremia in Neonates: Further Observations and the Occurrence of Focal Infection. *Pediatrics*, **74**, 832-837. https://doi.org/10.1542/peds.74.5.832