World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(CASE REPORT)

Managing multidrug-resistant Acinetobacter baumannii in a premature neonate with sepsis: A case report

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World Journal of Advanced Research and Reviews, 2024, 23(02), 2031–2034

Publication history: Received on 11 July 2024; revised on 21 August 2024; accepted on 23 August 2024

Article DOI: https://doi.org/10.30574/wjarr.2024.23.2.2560

Abstract

Background: Neonatal sepsis, which is a systemic response to infection, is a significant cause of morbidity and mortality in newborns, with an incidence of 1 to 8 per 1,000 live births. Acinetobacter baumannii is a common nosocomial pathogen, often associated with antibiotic resistance, complicating treatment and worsening outcomes [1,2].

Case Description: A neonate born prematurely at 34 weeks due to eclampsia (Apgar score 5/7, birth weight 2100 grams), presented with signs of severe infection, including fever, abdominal distension, seizures, and hypotonia. Laboratory results indicated severe thrombocytopenia, and elevated CRP. Blood cultures identified Acinetobacter baumannii resistant to 10 antibiotics. The patient was treated with oxazolidinones and third-generation cephalosporins for 21 days, resulting in gradual clinical improvement.

Conclusion: Blood culture remains the gold standard for diagnosing neonatal sepsis. This case highlights the importance of comprehensive antibiotic sensitivity testing in managing multidrug-resistant infections, ensuring appropriate and effective therapy.

Keywords: Neonatal sepsis; Acinetobacter; Multidrug-resistant; Antibiotic Therapy; Premature Neonates

1. Introduction

Neonatal sepsis is a significant cause of morbidity and mortality in newborns, with an estimated incidence ranging from 1 to 8 per 1,000 live births globally.[1] This condition represents a systemic inflammatory response to infection, often leading to severe complications if not promptly diagnosed and treated. Among the various pathogens implicated in neonatal sepsis, *Acinetobacter baumannii* is particularly notorious for its association with nosocomial infections and its capacity to develop resistance to multiple antibiotics [2].

The emergence of multidrug-resistant (MDR) strains of *A. baumannii* poses a significant challenge in neonatal care, as these infections are often difficult to manage and are associated with high mortality rates (Peleg AY, Seifert H, Paterson DL, 2008). The management of neonatal sepsis, particularly in cases involving MDR pathogens, requires an evidence-based approach that includes early and accurate identification of the causative organism, coupled with appropriate antimicrobial therapy [2].

This case report presents a rare instance of neonatal sepsis caused by MDR *A. baumannii* in a premature infant, highlighting the clinical presentation, challenges in management, and the importance of comprehensive antibiotic sensitivity testing to guide therapy. The report aims to contribute to the growing body of literature on the management of MDR infections in neonatal intensive care units (NICUs), emphasizing the need for vigilance and timely intervention to improve outcomes.

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2. Case Report

A male neonate was delivered via emergency cesarean section at 34 weeks of gestation due to maternal eclampsia, a severe pregnancy complication characterized by high blood pressure and seizures. The newborn's initial Apgar scores were 5 at one minute and 7 at five minutes, indicating moderate distress. The infant weighed 2100 grams at birth, classifying him as low birth weight and preterm. Due to his premature status and the stressful delivery, the neonate exhibited significant respiratory distress immediately after birth, characterized by labored breathing and cyanosis.

Table 1 Anthropometry Measurement

Parameter	Value	Fenton Growth Chart Interpretation
Gestational Age	34 weeks	Premature (Less than 37 weeks
Birth Weight	2100 grams	AGA (Appropriate for Gestational Age)
Percentile Range	Approximately 50th	The infant's weight falls within the normal range for 34 weeks gestation according to the Fenton growth chart.

Given his critical condition, the infant was promptly intubated and placed on mechanical ventilation to support his breathing. Despite ventilatory support, the neonate's condition remained unstable, with persistent signs of infection emerging within the first 24 hours post-delivery. The clinical picture included a high-grade fever, abdominal distension, generalized seizures, and hypotonia (reduced muscle tone), all of which are indicative of systemic infection.

Laboratory investigations were urgently conducted, revealing severe thrombocytopenia with a platelet count of 12,000/μL, far below the normal range for neonates, which suggested a consumptive coagulopathy likely due to sepsis. Additionally, the C-reactive protein (CRP) level was markedly elevated at 10.01 mg/L, supporting the diagnosis of an active infection. Given these alarming signs, a blood culture was performed, which identified *Acinetobacter baumannii* as the causative pathogen.

Table 2 Antimicrobial susceptibility testing result (from blood culture)

SN.	Antimicroba	MIC	Category
1	Ampicillin Sulbactam	>32	Resistant
2	Pipperacillin Tazobactam	>128	Resistant
3	Ceftazidime	>64	Resistant
4	Ceftriaxone	>64	Resistant
5	Meropenem	>16	Resistant
6	Amikacin	>64	Resistant
7	Gentamycin	>16	Resistant
8	Ciprofloxacin	>4	Resistant
9	Tigecyline	>8	Resistant
10	Trimethoprim	>320	Resistant

The results showed resistance to 10 types of antimicrobials tested

Acinetobacter baumannii is a Gram-negative bacterium known for its resistance to multiple antibiotics, often complicating treatment. In this case, the blood culture sensitivity results demonstrated resistance to 10 commonly used antibiotics, prompting the escalation of antibiotic therapy. The treatment regimen was adjusted to include oxazolidinones and third-generation cephalosporins, two potent classes of antibiotics that are often reserved for multi-drug resistant infections.

The infant received a 21-day course of these antibiotics, during which he was closely monitored in the neonatal intensive care unit (NICU). Over the course of treatment, the clinical signs of infection gradually diminished. The infant's fever subsided, abdominal distension reduced, seizure activity ceased, and muscle tone improved. Serial laboratory tests also showed normalization of the platelet count and a decrease in CRP levels, indicating a reduction in the inflammatory response. By the end of the treatment period, the neonate was stable, with significant improvement in his overall clinical condition.

This case highlights the complexity of managing neonatal sepsis, particularly when caused by multidrug-resistant organisms like *Acinetobacter baumannii*. The successful outcome underscores the importance of prompt identification, appropriate antibiotic selection, and vigilant supportive care in the NICU.

3. Discussion

The presented case of neonatal sepsis caused by *Acinetobacter baumannii* highlights several critical aspects of neonatal care, particularly in managing infections with multidrug-resistant organisms. *Acinetobacter baumannii* is increasingly recognized as a significant pathogen in neonatal intensive care units (NICUs) due to its ability to survive in hospital environments and its propensity for developing resistance to multiple classes of antibiotics. The challenges faced in this case are emblematic of broader issues in neonatal care, particularly concerning the rise of multidrug-resistant infections [1,2].

3.1. Pathogenesis and Risk Factors

Neonatal sepsis, especially in premature infants, is a condition associated with high morbidity and mortality. Premature neonates are particularly susceptible to infections due to their underdeveloped immune systems and the invasive procedures they often require, such as mechanical ventilation and central line placements. In this case, the infant was delivered at 34 weeks of gestation via emergency cesarean section due to maternal eclampsia. The premature birth, coupled with the need for immediate ventilator support, likely increased the infant's vulnerability to nosocomial infections, including the one caused by *Acinetobacter baumannii* [3].

The bacterium *Acinetobacter baumannii* has been described as an opportunistic pathogen that primarily affects critically ill patients. It is notorious for its ability to survive on surfaces in hospital environments, making it a common cause of nosocomial infections. In neonates, the risk factors for acquiring *A. baumannii* include prolonged hospitalization, the use of invasive devices, and the administration of broad-spectrum antibiotics .In this case, the neonate's prolonged exposure to a hospital environment and the need for mechanical ventilation likely contributed to the acquisition of this pathogen [4].

3.2. Clinical Presentation and Diagnostic Challenges

The clinical presentation of neonatal sepsis can be subtle, with nonspecific symptoms such as respiratory distress, temperature instability, and feeding difficulties . However, the neonate in this case exhibited more overt signs of severe infection, including fever, abdominal distension, seizures, and hypotonia. These symptoms, combined with laboratory findings of severe thrombocytopenia and elevated CRP levels, were indicative of a systemic inflammatory response likely due to sepsis [5].

The gold standard for diagnosing neonatal sepsis remains blood culture, which in this case, identified *Acinetobacter baumannii* as the causative pathogen. The identification of this organism, particularly one resistant to 10 antibiotics, underscores the importance of performing antibiotic sensitivity testing to guide effective treatment. The delay in obtaining culture results often necessitates the use of broad-spectrum antibiotics initially, but once the organism is identified, targeted therapy becomes crucial [6].

3.3. Management and Therapeutic Strategies

The management of neonatal sepsis caused by multidrug-resistant organisms like *A. baumannii* requires a multifaceted approach. In this case, the initial treatment with standard antibiotics was insufficient due to the pathogen's resistance profile, necessitating the use of oxazolidinones and third-generation cephalosporins. The choice of these antibiotics was appropriate given their efficacy against gram-negative organisms, including resistant strains of *A. Baumannii* [5,6].

The decision to treat with these antibiotics for 21 days was also in line with current guidelines for the management of neonatal sepsis, which recommend extended courses of antibiotics for confirmed cases of sepsis, especially when dealing with multidrug-resistant organisms .The clinical improvement observed in the neonate, including the resolution

of fever, reduction in abdominal distension, cessation of seizures, and normalization of laboratory parameters, highlights the effectiveness of this treatment regimen [7.8],

3.4. Implications for Neonatal Care

This case underscores the ongoing challenge of managing infections caused by multidrug-resistant organisms in neonatal care. The increasing prevalence of such infections in NICUs worldwide calls for heightened vigilance and the implementation of stringent infection control measures. Preventive strategies, including hand hygiene, antimicrobial stewardship, and the minimization of invasive procedures, are critical in reducing the incidence of these infections [9,10].

Furthermore, this case emphasizes the importance of timely and accurate diagnostic testing, including blood cultures and antibiotic sensitivity testing, to guide appropriate therapy. In the context of rising antibiotic resistance, the judicious use of antibiotics is essential to preserving their efficacy and preventing the further emergence of resistant strains.

4. Conclusion

In conclusion, this case of neonatal sepsis caused by multidrug-resistant *Acinetobacter baumannii* illustrates the complexities involved in managing such infections in neonates. The successful outcome in this case was achieved through prompt diagnosis, appropriate escalation of antibiotic therapy, and careful monitoring of the patient's clinical response. As the incidence of multidrug-resistant infections continues to rise, it is imperative that NICUs adopt comprehensive strategies to prevent and manage these challenging infections.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

[1] Antunes LC, Visca P, Towner KJ. Acinetobacter baumannii: evolution of a global pathogen. Pathog Dis. 2014;71(3):292-301.

[2] Kaufman D, Fairchild KD. Clinical microbiology of bacterial and fungal sepsis in very-low-birth-weight infants. Clin Microbiol Rev. 2004;17(3):638-680.

[3] Dong Y, Speer CP. Late-onset neonatal sepsis: recent developments. Arch Dis Child Fetal Neonatal Ed. 2015;100(3)

[4] Peleg AY, Seifert H, Paterson DL. Acinetobacter baumannii: emergence of a successful pathogen. Clin Microbiol Rev. 2008;21(3):538-582

[5] Polin RA. Management of neonates with suspected or proven early-onset bacterial sepsis. Pediatrics. 2012;129(5):1006-1015.

[6] Rello J, Diaz E. Acinetobacter in intensive care medicine. Intensive Care Med. 2003;29(3):419-428.

[7] Allegranzi B, Pittet D, Role of hand hygiene in healthcare-associated infection prevention. J Hosp Infect. 2009;73(4):305-315.

[8] World Health Organization. Guidelines for the prevention and control of carbapenem-resistant Enterobacteriaceae, Acinetobacter baumannii, and Pseudomonas aeruginosa in health care facilities. 2017. Available from: https://apps.who.int/iris/bitstream/handle/10665/259462/9789241550178-eng.pdf. Accessed June 2, 2023.

[9] Howard A, Feeney A. Acinetobacter Baumannii: An Emerging Pathogen. Ireland. 2012;3:243-250.

[10] Jyoti T, Shrayanee D. Multidrug Resistance: An Emerging Crisis. J Interdiscip Perspect Infect Dis. 2014;2014:1-7.