Original Research Article

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20172674

Study of the immediate clinical outcome of neonatal sepsis in the neonatal I.C.U. of a tertiary care hospital

Mohamed Reshad*, Tania Mundol, Mithun H. K., Anitha S. Prabhu

Department of Paediatrics, Yenepoya Medical College, Derlakatte, Mangalore, Karnataka, India

Received: 10 April 2017 Accepted: 02 May 2017

*Correspondence: Dr. Mohamed Reshad,

E-mail: mohdreshad@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: According to the status of newborns report 2014, about 0.76 million neonatal deaths occur in India, the highest for any country in the world. Although the neonatal mortality rate (NMR) has declined in the last 2 decades, the early NMR has been the slowest to decline. The three major causes of neonatal deaths are preterm birth complications, infections, and intrapartum related complications; together, they contribute to nearly 90% of total neonatal deaths. The aim of the study was to study the immediate clinical outcomes of culture proven neonatal sepsis in the NICU of Yenepoya Medical College Hospital during the period January 2016 to June 2016.

Methods: Retrospective hospital based study of records of all neonates admitted to the NICU with blood culture positive neonatal sepsis from January 2016 till June 2016. Blood cultures were done using the BACTEC 460. Data analysed using SPSS version 20.

Results: A diagnosis of probable sepsis was made in 84 (54%) of the total neonates (154) admitted to the NICU during the study period of which 6 were out born babies. Culture positive sepsis was found in 11.6% (18). The most commonly isolated organisms were Escherichia coli, Enterococcus and coagulase negative Staphylococcus aureus. Of the total 18 culture positive cases, urine culture was positive in only 2 cases while the remaining had a positive blood culture. Among the 18 cases of culture positive neonatal sepsis, 8 died while 10 survived.

Conclusions: Incidence of neonatal sepsis was relatively high in YMCH with the most predominant organism being coagulase negative *Staphylococcus aureus*. 12.7% of the sepsis cases died. Resistance to cefotaxime and ampicillin was prevalent.

Keywords: Blood culture, Clinical outcome, Neonatal sepsis

INTRODUCTION

Neonatal sepsis is one of the leading causes of morbidity and mortality among the newborns especially in the developing world.¹ More than half of the neonates admitted to the NICU carry a discharge diagnosis of probable sepsis. The signs and symptoms of neonatal sepsis are nonspecific and it carries a high risk of mortality (5-15%).² A major risk factor is the neonate's

immature immune system and these infections are caused by a group of organisms that are unique to the perinatal period. A major proportion of the NICU inpatients receive antibiotics, either empirically or for proven sepsis. Definitive tests such as blood cultures are not rapid or particularly sensitive while screening tests such as W.B.C counts and CRP have at best a positive predictive value of about 40%.² Manifestations of neonatal sepsis include: feeding problems, convulsions,

lethargy, respiratory rates >60 breaths per minute, severe chest indrawing, axillary temperature >37.5°C or <35.5°C.^{3,4}

According to the status of newborns report 2014, about 0.76 million neonatal deaths occur in India, the highest for any country in the world.⁵ Although the neonatal mortality rate (NMR) has declined in the last 2 decades, the early NMR has been the slowest to decline.⁶ The three major causes of neonatal deaths are preterm birth complications, infections, and intrapartum related complications; together, they contribute to nearly 90% of total neonatal deaths.^{7,8}

Various studies cite concerns about the emerging resistance of common causative pathogens of neonatal sepsis to the frequently used antibiotics. The pitfalls of antibiotic therapy in the setting of negative cultures include increased risk of candidiasis, necrotising enterocolitis and late-onset sepsis. Survivors of neonatal sepsis stand a higher risk of impaired neurodevelopmental outcomes.

The aim of the study was to evaluate the immediate clinical outcomes of culture proven neonatal sepsis in the NICU of Yenepoya Medical College Hospital, Mangalore during the study period January 2016 to June 2016. As well as to determine the most common isolated pathogen and its antibiotic sensitivity pattern.

METHODS

Retrospective hospital based study of the records of all neonates admitted to the NICU with a discharge diagnosis of probable sepsis and all culture positive neonatal sepsis cases from January 2016 till June 2016. Blood cultures were done using the BACTEC 460. Records were analysed and data collected for clinical outcome of the shortlisted cases, organisms grown on culture with their sensitivity patterns, treatment given and its duration.

RESULTS

Culture positive sepsis was found in 11.6% (18) of the total neonates (154) admitted to the NICU during the study period of which 6 were out born babies (Table 1). The most commonly isolated organisms were Escherichia coli and coagulase negative *Staphylococcus aureus*.

Of the total 18 culture positive cases, urine culture was positive in only 2 cases while the remaining had a positive blood culture (Table 2). The mean duration of antibiotic treatment was 7 days. The most common presenting symptoms were lethargy, poor feeding and fever. Antibiotic sensitivity studies showed a high rate of resistance to cefotaxime, ampicillin and gentamicin. Most of the isolated organisms were sensitive to cefepime, gentamicin and amikacin Among the 18 cases of culture positive neonatal sepsis, 8 died while 10 survived.

Table 1: Frequency of variables present in neonates with probable sepsis.

Variables assessed	Frequency	(%)		
Mode of delivery				
NVD	68	81		
LSCS	16	19		
Birth weight				
AGA	62	74		
SGA	17	20		
LGA	5	59		
Gestation				
Term	67	80		
Preterm	17	20		
Amniotic fluid				
Clear	72	86		
Meconium stained	12	14		
C-Reactive protein levels				
≤5	6	7		
5-10	12	14		
>10-20	34	40		
>20	32	38		
H/o PROM	4	5		
Symptoms				
Fever	8	10		
Lethargy/poor feeding	11	13		
Vomiting	7	8		

Table 2: Frequency of positive cultures.

Sample	Frequency	%
Blood	16	89
Urine	2	11
Isolated pathogens		
E. Coli	5	28
CONS	5	28
Enterococcus	5	28
Others	3	16

Table 3: Duration of antibiotic therapy.

Duration of antibiotic therapy	No. of days
< 5 days	6
5 - 7 days	37
8 - 10 days	13
11 - 14 days	9
> 15 days	5

Table 4: Antibiotic sensitivity pattern.

Antibiotic	Sensitive	Resistant
Cefotaxime	6	6
Gentamicin	8	4
Amikacin	8	1
Ampicillin	2	4
Piperacillin + Tazobactam	7	4
Cefepime	10	
Imipenem/Meropenem	7	3

DISCUSSION

Neonatal sepsis has always been a cause of concern for the paediatricians throughout the ages. With the causative factors and risk factors being multiple, neonates are always under the risk of being infected. With the advent of modern tests, the clinical outcome of those babies with sepsis has improved significantly. In this study, we tried to study the immediate outcome of those neonates admitted in our NICU with neonatal sepsis. Since there is always an added risk of antibiotic resistance, we also tried to match the antibiotic sensitivity of the most commonly isolated pathogen. The incidence of culture positive sepsis in our study was 11.6% (18 out of 154 neonates) with the most common isolated organisms being Eschericia coli and coagulase negative Staphylococcus aureus.

A study published by Jajoo M in 2015, where they studied the incidence of sepsis in outborn Nicu, had an overall sepsis rate of 18/1000 neonates admitted. ¹¹ *Klebsiella pneumonie* (36%), *Staphylococcus aureus* (21%), and *Escherichia coli* (14%) were the most common organisms.

In Zakariya BPs study published in 2011, incidence of culture proven sepsis was 41.6% (50 of 120). 12 Klebsiella pneumoniae was isolated from 66% of culture positive cases followed by Coagulase-negative staphylococci in 12% of cases. The incidence of sepsis and the isolated organisms can vary between different NICUs depending on the number of cases as well as the referral status. Generally, it is seen that referral centres have a higher rate of sepsis. It is not possible to set an antibiotic protocol for neonatal sepsis, as the resistance pattern may vary among NICUs. In our study, Antibiotic sensitivity studies showed a high rate of resistance to Cefotaxime, Ampicillin and Gentamicin. Most of the isolated organisms were sensitive to Cefepime, Gentamicin and Amikacin. In Gandhi et al study on incidence of neoanatal sepsis, gram positive bacteria were highly resistant to penicillin and Gram-negative bacteria exhibited high resistance to the commonly prescribed group of drugs such as penicillins, cephalosporins and aminoglycosides.¹³ In Zakariya BPs study, Klebsiella pneumoniae was resistant to most of the antibiotics tested except amikacin and meropenem.¹²

Ours was a referral NICU and hence had a mixture of multiple organisms. Hence it is prudent to follow an antibiotic pattern that best suits each individual NICU, rather than providing a blanket coverage with known antibiotics.

CONCLUSION

In this study, the incidence of neonatal sepsis was found to be 11.6% (18) in YMCH with the most predominant organisms being *Escherichia coli* and coagulase negative Staphylococcus aureus. 12.7% of the sepsis cases died.

Resistance to cefotaxime and ampicillin was prevalent. A strong index of suspicion is required for the early diagnosis of neonatal sepsis due to the subtle and non-specific nature of the presenting symptoms. A detailed antenatal history is also of paramount importance. Reducing the inadvertent use of antibiotics with the proper use of screening tests and cultures will aid in preventing the emergence of resistant pathogens. Strict adherence to antibiotic policies and management protocols is recommended.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- 1. Lander T. Neonatal and perinatal mortality: country, regional and global estimates. World Health Organization; 2006.
- 2. Gerdes JS. Diagnosis and management of bacterial infections in the neonate. Pediatric Clinics of North America. 2004;51(4):939-59.
- 3. Gerdes JS. Clinicopathologic approach to the diagnosis of neonatal sepsis. Clinics in perinatology. 1991;18(2):361-81.
- 4. Edmond K, Zaidi A. New approaches to preventing, diagnosing, and treating neonatal sepsis. PLoS Med. 2010;7(3):e1000213.
- PHFI, AIIMS, and SC- State of India's Newborns (SOIN) 2014- a report. (Eds) Zodpey S and Paul VK. Public Health Foundation of India, All India Institute of Medical Sciences and Save the Children. New Delhi, India Available from: https://www.newbornwhocc.org/SOIN_PRINTED% 2014-9-2014.pdf
- 6. Thaver D, Ali SA, Zaidi AK. Antimicrobial resistance among neonatal pathogens in developing countries. Pediatric Infect dis J. 2009;28(1):19-21.
- 7. Saleem M, Shah KI, Cheema SM, Azam M. Hematological scoring system for early diagnosis of neonatal sepsis. J Rawalpindi Medic College (JRMC). 2014;18(1):68-72.
- 8. Mitha A, Foix-L'Hélias L, Arnaud C, Marret S, Vieux R, Aujard Y, et al. Neonatal infection and 5-year neurodevelopmental outcome of very preterm infants. Pediatrics. 2013:peds-2012.
- 9. Polin RA. Management of neonates with suspected or proven early-onset bacterial sepsis. Pediatrics. 2012;129(5):1006-15.
- 10. Tripathi N, Cotten CM, Smith PB. Antibiotic use and misuse in the neonatal intensive care unit. Clinics in perinatology. 2012;39(1):61-8.
- 11. Jajoo M, Kapoor K, Garg L K, Manchanda V, Mittal S K. To study the incidence and risk factors of early onset neonatal sepsis in an out born neonatal intensive care unit of India. J Clin Neonatol. 2015;4:91-5.

- 12. Zakariya BP, Bhat V, Harish BN, Arun Babu T, Joseph NM. Neonatal sepsis in a tertiary care hospital in South India: Bacteriological profile and antibiotic sensitivity pattern. Indian J Pediatr. 2011;78:413-7.
- 13. Gandhi S, Ranjan KP, Ranjan N, Sapre N, Masani M, Incidence of neonatal sepsis in tertiary care hospital: an overview. Int J Med Sci Public Health 2013;2(3):548-52.

Cite this article as: Reshad M, Mundol TH, Mithun HK, Prabhu AS. A cross-sectional study of awareness regarding dog bite and its management in rural community of Maharashtra, India. Int J Contemp Pediatr 2017;4:1401-4.