

## Review

# Blood-culture-proven neonatal septicaemia: a review of 36 cases

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**SUMMARY** The cases of 36 newborns seen in the neonatal unit of Al-Fatah Children's Hospital in Benghazi, Libyan Arab Jamahiriya, with blood-culture-proven septicaemia were reviewed to determine clinical profile and outcome. There were 22 males and 14 females. Of these, 12 infants were premature with a gestational age of < 37 weeks and 24 were full term (gestational age > 37 weeks). At diagnosis, 11 cases were under 4 days of age. The most common symptoms were lethargy and feeding intolerance. *Klebsiella* was the most common etiological microorganism. Bacterial isolates were resistant to ampicillin and gentamicin but sensitive to cefotaxime. Of the 36 infants, 12 died (fatality rate = 33%).

## Introduction

Neonatal septicaemia describes any systemic bacterial infection documented by a positive blood culture. It is usually divided into two types. Early-onset septicaemia is seen within the first 4 days of life and has a relatively high mortality rate between 15% and 50%. Late-onset septicaemia starts after the first 4 days of life and may result in mortality rates up to 15% [1].

Preterm neonates are at higher risk of septicaemia because of their low immunity and their need for invasive procedures, e.g. intravenous lines, endotracheal intubation and mechanical ventilation, and they have a higher mortality rate than full-term infants [2].

As there had been no previous study addressing this important problem in our nursery, we conducted the present study retrospectively to determine the gestational

age and the clinical profile of our patients, the types of bacteria responsible for the septicaemia, the antibiotic sensitivity pattern and the outcome of these patients.

## Patients and methods

The study was conducted in the neonatal unit at Al-Fatah Children's Hospital, Benghazi, Libyan Arab Jamahiriya. The unit has a maximum capacity of 45 inpatients at a time. During the study period, October 1997 to March 1998, the total number of admissions was 610 patients.

The medical records of 36 neonates with positive blood cultures were reviewed. The following data were extracted: gestational age and postnatal age of each case at the time of diagnosis, symptoms and signs that indicated a blood culture, results of all cultures performed (blood, cere-

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brospinal fluid, urine and stool), bacterial types isolated from blood and their antibiotic sensitivity pattern, and the number of deaths.

## Results

The total number of neonates with positive blood culture was 36, 22 of whom were boys and 14 were girls. The male:female ratio was 1.5:1. Of the 36, 24 (67%) were full term, i.e. gestational age > 37 weeks and 12 (33%) were preterm, i.e. gestational age < 37 weeks. The most common early symptoms and signs of septicaemia were lethargy and unwell-looking (28 cases) and feeding intolerance (21 cases) (Table 1).

Table 1 Symptoms and signs at onset of septicaemia in the 36 neonates

Symptom/sign	No.	%
Lethargic or unwell-looking	28	78
Feeding intolerance	21	58
Respiratory distress/apnoea	20	55.5
Low or high temperature	10	28
Swelling or tender limb/joint	6	17

In all, 11 neonates had early-onset septicaemia; 8 of them (73%) were premature and only 3 (27%) were full-term. None had localized infection. Only one full-term infant died, whereas all 8 premature infants died (Fisher exact test  $P = 0.054$ , not statistically significant at 5% level). The commonest bacteria isolated in this group were *Enterobacter* species (Table 2).

Of the 36 neonates, 25 (69%) had late-onset septicaemia; 20 (80%) were full-term and 5 (20%) were preterm. Furthermore, 2 (8%) had meningitis and 6 (24%) had osteomyelitis septic arthritis (4 of these developed bone changes on X-ray later in the course of their illness). Only 1 infant had a positive urine culture.

Of those with late-onset septicaemia, 3 (24%) died; all were full-term. The most common bacteria isolated from the late-onset group were *Klebsiella* spp. (28%), followed by *Serratia* spp. (14%). *Staphylococcus aureus* comprised 6 (17%) of the isolates and 30 of the bacterial isolates (83%) were Gram-negative bacteria (*Klebsiella* spp., *Serratia* spp., *Enterobacter* spp., *Pseudomonas* spp., *Salmonella* spp. and *Escherichia coli*) (Table 3). Using the chi-squared test to compare Gram-positive isolates with Gram-negative isolates, we

Table 2 Types of bacteria isolated by gestational age and outcome of early-onset septicaemia

Species	Preterm			Full-term		
	No. of deaths	%		No. of deaths	%	
<i>Enterobacter</i>	3	100		1	100	
<i>Salmonella</i>	2	100		—	—	
<i>Escherichia coli</i>	1	100		—	—	
<i>Klebsiella</i>	1	100		1	0	0
<i>Pseudomonas</i>	1	100		1	0	0
Total	8	100		3	33.3	

Table 3 Bacterial types isolated by number of isolates and number of deaths

Species	No. of isolates	%	No. of deaths	%
<i>Klebsiella</i>	12	33	2	17
<i>Staphylococcus aureus</i>	6	17	0	0
<i>Serratia</i>	5	14	1	20
<i>Enterobacter</i>	5	14	4	80
<i>Pseudomonas</i>	4	11	2	50
<i>Salmonella</i>	2	5.5	2	100
<i>Escherichia coli</i>	2	5.5	1	50
Total	36	100	12	33

Table 4 Antibiotic sensitivity pattern of the bacteria isolated

Antibiotic	<i>Klebsiella</i>		<i>Serratia</i>		<i>Enterobacter</i>		<i>Pseudomonas</i>		<i>Salmonella</i>		<i>Escherichia coli</i>		<i>Staphylococcus aureus</i>	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Ampicillin	—	—	—	—	—	—	—	—	—	—	1	50	6	100
Gentamicin	5	42	1	20	2	40	2	50	—	—	1	50	1	17
Cefotaxime	8	67	5	100	1	20	1	25	1	50	—	—	5	83
Colistin	6	50	2	40	2	40	1	25	0	—	—	—	—	—
Augmentin	3	25	—	—	1	20	—	—	—	—	1	50	5	83
Piperacillin	6	50	4	80	1	20	—	—	1	50	—	—	—	—
Total	12		5		5		4		2		2		6	

found  $\chi^2_6 = 3.6$ ,  $P > 0.05$ , which was not statistically significant.

All Gram-negative bacteria isolated from our patients were resistant to commonly used antibiotics, e.g. ampicillin and gentamicin. *Enterobacter* spp. and *Pseudomonas* spp. were also resistant to piperacillin and augmentin (Table 4).

Of the neonates, 12 died (33%); 9 of the 12 (75%) died with early-onset septicaemia

and 3 (25%) died with late-onset septicaemia. Using the chi-squared test to compare deaths with early-onset septicaemia to deaths with late-onset septicaemia, we found  $\chi^2_1 = 14.06$ ,  $P < 0.001$ , which was statistically significant. Of the 9 who died with early-onset septicaemia, 8 (89%) were premature. Of the 3 with late-onset septicaemia who died, all were full-term.

## Discussion

Our study of 36 neonates with positive blood culture, 12 (33%) died. Similar mortality rates have been recorded in many countries, including some Arab countries, [2-4]. Early-onset septicaemia resulted in a higher mortality rate, especially among premature neonates. Similar observations have been made by other authors [2-5].

Of the 25 infants with late-onset septicaemia, 9 had localized infection and 3 full-term babies died. Most infections in this group were caused by *Klebsiella* spp. Other

researchers have made similar observations [2,4,6,7,9].

All Gram-negative bacterial isolates were resistant to commonly used antibiotics, such as ampicillin and gentamicin. This observation is similar to that of other researchers [1,6,8].

The high incidence of Gram-negative septicaemia and the antibiotic sensitivity pattern indicate that the infection was most probably nosocomial in origin and that cefotaxime should be used as an initial therapy while awaiting culture results.

## References

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