NEONATAL SEPSIS- ETIOLOG1CAL STUDY

Pages with reference to book, From 327 To 330

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Abstract

The microbiological pattern of proven early neonatal sepsis is reported between the period of 1st January, 1984 to 31st December, 1985.
Of 198 blood cultures, 30(43.5%) and 53 (41.0%) were positive in 1984 and 1985, respectively. There was considerable variability in the spectrum of organisms in these two years. The type of organisms found and their sensitivity to antibiotics was marked different from that reported in Western literature. Most organisms were found to be resistant to commonly used antibiotics. Cefotaxime and Tobramycin were most effective, while Fosfomycin was found to be effective against enterococci (JPMA 37: 327: 1987).

INTRODUCTION

Neonatal Sepsis is a clinical syndrome characterised by symptomatic and systemic illness and bacteria in the blood[1]. Its incidence in the West is approximately 1/1000 in full term and 4/1000 in premature babies.[2] The figures have remained fairly constant over the past 30 years[3-5] although the type of organisms causing disease have changed over a number of years[2].
The pattern of etiological agents usually differs from country to country. For example in Latin America Salmonella and in Spain Listeria Monocytogenes is frequently involved in causing sepsis[2,4-6]
Scant published data is available from Pakistan on the common organisms involved in sepsis and their pattern of sensitivity to commonly used antibiotics. This study was undertaken to identify organisms causing neonatal sepsis together with their sensitivity pattern to antibiotics. An attempt was also made to establish any change in the sensitivity pattern over the course of two years.

PATIENTS AND METhODS

The data included is on patients admitted between 1st January, 1984 uptil 31st December, 1985. Only early sepsis (less than 1 week of age) wau studied as babies beyond one week of age are not admitted to our nursery. Hospital and. home deliveries were included to determine if the causative organisms and/or their sensitivity pattern varied with environment.
Criteria used to include babies in the study consisted of symptoms and signs commonly associated with sUspected sepsis (Table-I).

TABLE – I
Criteria for Suspected Sepsis*.

1. Prolonged rupture of membranes > 24 hours.
2. Persistant fever Hypothermia.
3. Lethargy and refusal to feed (without obvious cause).
4. Jaundice with refusal to feed and/or lethargy.
5. Loose motions > 5/day with or without blood or mucus.
6. Vomiting, bile-stained or persistant.
7. Infected skin or infected umblicus with discharge.
8. Respiratory distress without obvious cause.
9. Convulsions, after excluding other causes, with positive CSF findings.

* Babies > 7 days of age not included in study.

After a detailed history and physical examination, blood was drawn for culture and complete blood count. Other cultures e.g. CSF, Urine and Umbllcal Swab were obtained as and when indicated. Blood cultures were inoculated on Dextrose broth (oxoid) and Thioglycollate broth, and incubated aerobically and anaerobically. Subcultures and gram stains were done 48 hours later. Blood agar and Mac Conkey agar were used for sub.cultures which were again incubated aerobically and anaerobically Groeth obtained form different media was co-rtlaued by microscopic and gram – stain examination. Catalase and Staph slide test (Biomerieux) were performed for identification of streptococci and staphylococci respectively. Streptex (Weilcome) was used for grouping streptococci (Lancefield grouping). Oxidase test was used to identify gram negative bacilli. Oxidase positive bacilli were put through the oxiferm tube (Roche) and oxidase negative through the Entero tube II (Roche).
Cultures other than blood were inoculated intO a bottle of Stuart's transport medium (modi. fled oxoid) and later plated onto two blood agar plates (for aerobic and anaerobic incubation) and Mac Conkey agar. A gram stain was also done at the time of moculation and after incubation. Further identification procedures were as for blood cultures.
Every baby suspected of having sepsis was given Ampicillin and Tobramycin initially. Later Cephradine and Tobramycin were used routinely as initial reports revealed high resistance of most

organisms to Ampicillin. Antibiotics were changed, as needed, after the results of the culture were obtained, or if the baby's clinical condition did not improve within 48 hours. The antibiotics were continued for ten days, but the duration was increased in those with meningitis or delayed recovery. A baby was kept on antibiotics on clinical grounds even if the blood culture was negative.

RESULTS

The results have been presented separately for 1984 and 1985. Sixty nine and 129 blood cultures were done in 1984 and 1985, of which 30 (43.4%) and 53 (42.0%) were positive. Of the total admissions 10.49% in 1984 and 18.15% in 1985 had neonatal sepsis.

Male preponderance was noted in all the culture positive cases seen over two years. Male to female ratio was 1.5:1 and 2.7:1 in 1984 and 1985 respectively. Overall mortality was 40% and 56% in the two years. Death frequency for males was 33% and 67% for females in 1984 while in 1985 it was more in males (70%) than females (30%).

The organisms cultured from blood are given in Table II.

TABLE – II

Organisms found in Positive Blood Cultures.

Organisms	1984	1985
E. Coli	37.5%	10.14%
Klebsiella	18.75%	34.78%
Coliforms	9.37%	–
Staphylococcus	25%	7.24%
Enterococci	9.37%	1.44%
Pseudomonas	–	11.59%
Salmonella	–	14.49%
Serratia	–	7.24%
Proteus	–	2.89%
*Miscellaneous	–	10.14%

* A few positive cultures had more than one organism.
No group 'B' Beta hemolytic streptococcus was grown.

Organisms cultured from sites other than blood are presented in Table III.

TABLE – III
Organisms grown from Sites Other than Blood.

Organisms	C.S.F.	Umblicus	Pus
E. Coli	–	01	02
Klebsiella	–	02	02
Salmonella	–	–	01
Pseudomonas	--	–	01
Streptococcus	–	*04	01
Staph. aureus	–	06	–
Proteus	–	02	–
Serratia	–	02	–
Pneumococci	01	–	–
Enterobacter	–	03	01
Citrobacter	–	02	–
Enterococci	–	01	–
Coliforms	–	01	–
	01	24	08

* Only one group B Beta hemolytic streptococcus was grown from umblical swab.

There was only one case with a positive CSF, culture out"B" Hemolytic Streptococcus was cultured from 4/24 umblical swabs. Whether they were colonised organisms or infective agents could not be determined. The sensitivity patterns of various bacteria are recorded in Table -IV and V.

TABLE – IV
Sensitivity Pattern of Organisms in Positive Blood Cultures (1984).

Organisms and Their Sensitivity to Antibiotics					
Antibiotics	E. Coli	Staphylococcus	Klebsiella	Coliforms	Enterococci
	12	8	6	3	3
Penicillin	0%	25%	0%	0%	0%
Ampicillin	8.33%	25%	0%	33.3%	66.66%
Tobramycin	33.33%	25%	66.6%	33.3%	66.66%
Gentamicin	33.33%	50%	16.66%	0%	33.3%
Cefuroxime	41.66%	42.8%	100%	0%	0%
Fosfomycin	63.63%	50%	50%	33.3%	100%
Chloramphenicol	33.33%	25%	66.6%	0%	33.3%
Cefotaxime	66.66%	75%	100%	66.66%	0%

TABLE – V

Sensitivity Pattern of Organisms in Positive Blood Cultures(1985).

Antibiotics	E. Coli	Staphyl-ococcus	Klebsiella	Salmonella	Serratia	Pseudomonas
	07	05	24	10	05	08
Penicillin	0%	40%	0%	0%	0%	0%
Ampicillin	28.5%	40%	0%	0%	0%	0%
Tobramycin	100%	100%	83.4%	90%	80%	100%
Gentamicin	100%	100%	17.3%	100%	80%	100%
Cefotaxime	71.4%	100%	66.6%	60%	80%	87.5%
Cefturoxime	57.1%	100%	34.7%	10%	75%	0%
Fosfomycin	57.1%	80%	54.1%	90%	25%	0%
Chloramphenicol	16.6%	60%	71.4%	11.1%	25%	0%
Cephradine	42.8%	80%	26.3%	50%	25%	0%

The sensitivity discs for few antibiotics were not available in some cases.

DISCUSSION

Neonatal Sepsis was more predominant in males in both the years, though mortality did not seem to vary uniformly between the two sexes. Mortality, evaluated according to gestational age and environment at birth (home or hospital), also did not show a statistically significant difference (p0.05 by chi square). The etiolo. gical pattern of neonatal sepsis was found to be very different in this study as compared to reported literature. Although E. Coli was found to be the most common etiological agent causing sepsis in 1984, there was a high frequency of infection due to Kiebsiella and, Salmonella in 1985. The change could partly be attributed to environmental factors in the nursery between 1984 and 1985 since between April 1984 and July 1985, newborns were admitted in a make shift nursery due.to building renovation.

Hemolytic Streptococcus group 'B' is the most frequently incriminated organism causing neonatal sepsis in Western literature. It was not grown in any of the blood cultures in this study although special methods were used to isolate it.

Commonly used antibiotics e.g. Ampicillin had a very low sensitivity pattern to most organisms as reported in Table IV and V. Cefotaxime and Tobramycin, in combination, were found to be the most effective broad spctrum antibiotics in this study, although a few resistant strains did appear.

Fosfomycin had a limited spectrum with a high rate of sensitivity towards Enterococci and Staphylococci.

Due to financial constraints and consequent lack of medical facilities in most of our hospitals routine blood cultures cannot be obtained in every case of suspected sepsis. It is however recommended to monitor blood cultures periodically on a random basis, to assess changes that might occur over a period of time.

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