ACINETOBACTER SEPSIS IN NEWBORNS

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Objective: *To evaluate the clinico-epidemiological profile of Acinetobacter sepsis in neonates.* ***Design:*** *Retrospective study.* ***Setting:*** *Level II Neonatal Care Unit.* ***Subjects:*** *79 neonates with blood culture positive for Acinetobacter.* ***Methods:*** *Relevant information was collected on a predesigned proforma from the case records and analyzed for clinical and epidemiological characteristics.* ***Results:*** *The incidence of Acinetobacter septicemia was 11.1/1000 live births. Fifty five babies were hospital born, 24 were outborn. Out of these, 64.6% babies were born at term and 40.5% had a birth weight of 2500 g or more. A cluster of 53 cases was seen between May and September 1995. In cases with early onset sepsis (onset <7days of postnatal age), difficulty in breathing (n=54), chest retraction (n=35) and refusal to feed (n=46) were seen more commonly as compared to late onset sepsis ($p<0.05$). Complications observed included meningitis, bleeding manifestations and necrotising enterocolitis in three, six and five babies, respectively. The organism was sensitive to ciprofloxacin (96.2%), amikacin (92.4%) and gentamicin (87.3%). A response rate of 52.4% was observed with Ciprofloxacin in babies not responding to cefotaxime and amikacin combination. The overall mortality was 13.9%.* ***Conclusion:*** *Nosocomial Acinetobacter sepsis may affect fullterm, appropriate for gestational age babies. Clinical presentation is indistinguishable from Gram negative septicemia. Life threatening complications can also occur. Ciprofloxacin may prove to be useful drug in resistant cases.*

Key words: *Acinetobacter, Neonate, Sepsis.*

OUTBREAKS of nosocomial infection in intensive care settings including neonatal units are not uncommon(l-4). Usually such outbreaks are caused by common pathogens. We encountered an outbreak in our Level II Neonatal Care Unit caused by an unusual organism - *Acinetobacter.* Medlar search for past 15 years revealed a total of 34 references. Of this 11 were from neonatal care units. There have been only two Indian reports(5,6) of *Acinetobacter* sepsis in neonates. We share our experience with this organism which revealed important differences in the clinical profile as compared to previous reports.

Subject and Methods

The case records of babies admitted to the nursery at Tata Main Hospital, Jamshedpur were analyzed retrospectively. Only symptomatic babies who had blood culture positive for *Acinetobacter,* were included in the study. A total of 79 cases were found over a period of one year from January 1995 to December 1995.

Relevant information was collected on a predesigned proforma, from case records of neonates for anlaysis. Analysis for various parameters included maternal illness before delivery, duration and type of labor, premature rupture of membrane, need for resuscitation, laryngeal suction at birth. Age at onset of symptoms, presenting symptoms and signs, treatment given, course during nursery stay and outcome were recorded. Sepsis was classified as early sepsis if onset of sepsis was seven days or less and late onset sepsis if onset of sepsis was after seven days(7). Blood culture(s) were obtained in glucose citrate broth, before starting antibiotics in symptomatic cases only and subcultures were done on McConkey's medium for further colony growth. Repeat blood cultures were taken when antibiotics were changed because of poor response. The criteria followed for poor response (after 48 hours) were: (i) Non responding fever in babies who did not look well otherwise as well; *(it)* Worsening respiratory status as assessed clinically by respiratory rate and chest retraction; and *(Hi)* Development of fresh complicates. Biochemical properties utilized for identification of *Acinetobacter* were negative oxidase reaction and inability to reduce nitrates(1). *In vitro* sensitivities were carried out using disc method. The surveillance study to detect the source of infection was carried out. In the first round only nursery sites including water taps, disposable syringes, autoclaved drums, baby incubators, baby cots, ambu bags and other resuscitation equipments, suction apparatus and hand swabs from persons working in nursery were cultured. As all were negative, study was extended to labor room and obstetric operation theatre sites. Swabs were taken from baby trays, resuscitation equipments, suction apparatus, bowls and water taps. Cultures from suction machines in labor room and obstetric operation theatre were found to be positive. These suction machines were removed and suction tubes were replaced, other parts were thoroughly cleaned and sterilized. Multiple swabs were taken before reusing them, to confirm the absence of the organism.

Results

A total of 7137 babies were delivered at our hospital during the study period. Nursery had 1583 admissions, of which 1177 were horn at our hospital and 406 were delivered outside. Among the hospital born babies, 406 had clinical sepsis, of which 251 were blood culture positive. The incidence of *Acinetobacter* sepsis was 11.1/ 1000 live births. *Acinetobacter* accounted for 79 (31.5%) of the blood culture positive sepsis. Other organisms were *Escherichia coli* (26.3%), *Klebsiella pneumoniae* (10.7%), *Pseudomonas aeruginosa* (7.2%), *Coagulase positive Staphylococci* (16.3%), *Coagulase negative Staphylococci* (4%), *Beta hemolytic Streptococci* (1.2%), enterobacter (1.2%), Pneumococci (1.2%) and *Micrococci* (0.4%).

Pure growth of *Acinetobacter* was observed in all 79 babies. Fifty five were delivered at our hospital and the rest outside. Of the 24 outborn babies, 15 had late onset sepsis. Outborn babies were admitted with a clinical diagnosis of low birth weight (n=13), respiratory distress (n=6) and birth asphyxia (n=5). Of the hospital borns, 20 were delivered by caesarian section and 35 vaginally. *Table I* shows the risk factors for infection in babies suffering from *Acinetobacter* sepsis. The male to female ratio was 1.5:1. Cases were seen throughout the year but a cluster of 53 cases was found between May and September 1995. There was no difference in clinical picture of babies with early onset sepsis and late onset sepsis exept that pneumonia was seen more commonly in early onset sepsis

TABLE I–*Risk Factors for Acinetobacter Sepsis*

Risk Factor	Overall (n=79)	Early onset sepsis (n=58)	Late onset sepsis (n=21)
Maternal			
PROM	12 (15.2)	12 (20.7)	0
Intrapartum pyrexia	3 (3.8)	2 (3.5)	1 (4.7)
Urinary tract infection	10 (12.7)	7 (12.3)	3 (14.3)
> 5 PV examination	2 (2.6)	2 (3.5)	0
Outside aseptic PV examination	6 (7.6)	5 (8.6)	1 (4.7)
Neonatal			
Prematurity	28 (35.4)	20 (34.4)	8 (38)
Low birth weight	47 (59.5)	42 (72.4)	5 (23.8)
Need for resuscitation			
Bag and mask	16 (20.2)	12 (20.7)	4 (19.0)
Endotracheal	8 (10.1)	8 (13.8)	0

PROM - Prolonged rupture of membranes; PV - Per vaginal.
Figures in parentheses represent percentages.

($p < 0.05$). Symptoms and signs are listed in *Table II.* Of the 32 babies with jaundice, serum indirect bilirubin levels were high enough to require exchange transfusion in 10 babies whereas 16 others needed phototherapy. Other complications noted were bleeding manifestations-six cases, necrotising enterocolitis (NEC)-five cases and meningitis in three cases. One of the three cases had a cerebrospinal fluid culture positive for *Acinetobacter.*

A total of 11/79 (13.9%) babies died. Death could be attributed to bleeding diathesis, NEC and meningitis in two cases each and acute respiratory failure because of pneumonia in one baby. No specific complication was seen in four babies who died. There was no significant difference in mortality rate between early onset (8/58, 13.8%) and late onset sepsis (3/21, 14.3%). Case fatality rates were not significantly ($p > 0.05$). different in preterm babies (6./28; 21.4%) as compared to term babies (5/51; 9.8%). *In vitro* sensitivity pattern of the organism is shown in *Table III.* All 79 babies received cefotaxime and amikacin as empirical treatment since this combination was being used as first line antibiotics in our unit. Two babies died within 48 hours of institution of antibiotic therapy. Twenty one subjects (26.6%) did not show response. Ciprofloxacin was added in these babies. Eleven babies showed favorable response and six expired. In remaining four cases, these drugs were withdrawn and a combination of cefoperazone and netilmycin and instituted. This combination could salvage only one baby while three expired.

Discussion

The Tata Main Hospital, Jamshedpur is

TABLE II–*Clinical Profile of Acinetobactor Sepsis*

Clinical features	Overall (n=79)	Early onset sepsis (n=58)	Late onset sepsis (n=21)
Hypothermia	9 (11.4)	6 (10.3)	3 (14.3)
Fever	52 (65.8)	38 (65.5)	14 (66.7)
Refusal to feed	46 (58.2)	30 (51.6)	16 (76.2)*
Poor reflexes	24 (30.3)	15 (25.8)	9 (42.9)
Pallor	22 (27.8)	16 (27.5)	6 (28.6)
Cyanosis	16 (20.2)	12 (20.7)	4 (19.0)
Abdominal distension	28 (35.4)	23 (39.6)	5 (23.8)
Loose motions	9 (11.4)	6 (10.3)	3 (14.3)
Vomiting	16 (20.2)	10 (17.2)	6 (28.6)
Unconjugated Hyperbilirubinemia	32 (40.5)	27 (46.6)	5 (23.8)
Difficulty in breathing	54 (68.3)	42 (72.4)	12 (57.1)*
Chest retraction	35 (44.3)	29 (50.0)	6 (28.6)*
Jitteriness	20 (25.3)	15 (25.8)	5 (23.8)
Tense anterior fontanelle	22 (27.8)	17 (29.2)	5 (23.8)
Convulsion	24 (30.3)	20 (34.4)	4 (19.0)

* $p < 0.05$ (as compared to early onset sepsis).
Figures in parentheses represent percentages.

TABLE III–*Sensitivity Pattern of Acinetobacter*

Drugs	Sensitivity		
	High	Moderate	Resistant
Ampicillin	9 (11.3)	12 (15.2)	58 (73.5)
Cephalexin	49 (62.0)	12 (15.2)	18 (22.8)
Cotrimoxazole	71 (89.8)	3 (3.8)	5 (6.4)
Chloramphenicol	63 (79.7)	10 (12.7)	6 (7.6)
Cefotaxime	58 (73.5)	8 (10.1)	13 (16.4)
Ciprofloxacin	76 (96.2)	0	3 (3.8)
Amikacin	73 (92.4)	3 (3.8)	3 (3.8)
Gentamicin	69 (87.3)	6 (7.6)	4 (5.1)

Figures in parentheses represent percentages out of total culture positive cases.

a 835 beded industrial hospital catering to the needs of employees of the Tata Iron and' Steel Company Limited, their families and others living in and around the township of Jamshedpur. It provides clinical training to the undergraduate and diploma course

students of MGM Medical College, Jamshedpur. Our nursery also serves as a referal centre for babies born outside the hospital. There were many striking points in the clinico-epidemiologic profile of these babies. The involvement of babies with normal birth weight, without being under intensive care, on antibiotic(s), mechanical ventilation or having indwelling catheters are important observations from the study as these were considered predisposing factors in previous reports from different parts of the world(5,6,8-13). Some of the clinical features like pneumonia(5,14), meningitis(10-12, 15-16), features of Gram negative sepsis(8) were also described by other workers. However, indirect hyperbilirubinemia, severe enough to require exchange transfusion, bleeding manifestations and NEC were not known to occur with *Adnetobacter* sepsis. This reflects unusual severity of infection in our babies, possibly because of high virulence of the organism hitherto considered opportunistic infection in immuno-deficient patients. Despite severity of infection, mortality rate (13.9%) in our series is lower as compared to others(2;6,8,12). We attribute this to involvement of babies with higher birth weights and without prior severe illness. This is also evident from the fact that mortality in low birth weight babies is comparable to others. A combination of cefotaxime and amikacin was effective in 70.8% cases. This compared favourably with *in vitro* sensitivity and previous reports(6,16,17). Ciprofloxacin, which is not considered safe for children and neonates, was used because of lack of alternative in life threatening situation. It is encouraging to see that no obvious side effect(s) were noted during the course of treatment and on short term follow-up among survivors. However, the data from the present study is not sufficient to conclude that the drug is safe for neonates.

In the initial phase of outbreak it was considered sporadic infection, because the number of the babies was small and involved both outborn as well as babies delivered in our hospital. With increasing number, efforts to isolate and identify the source of the organism was made. As outborn babies were also affected, source was sought within the neonatal unit. None was identified. Later on *Acinetobacter* could be isolated from the tip of the suction machine tubes of labor room and obstetric operation theatre which explained the infection in babies born vaginally as well as by caesarian section. As majority of outborn babies had this organism in blood culture sent a few days after admission, it was considered cross infection within the nursery. In remaining cases, the possibility of contamination of culture specimen cannot be ruled out.

On the basis of the present study, we conclude that *Acinetobacter* can be a cause for concern in neonatal units, can reach outbreak proportions and may involve babies with normal birth weight who are apparently not immuno-deficient. It may be associated with severe complications like bleeding diathesis, NEC, meningitis and hyperbilirubinemia with consequent high mortality. Appropriate corrective measures should be taken at the earliest sign of *Acinetobacter* infection in a neonatal unit.

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