Nosocomial *Salmonella bareilly* Septicemia: A Nursery Outbreak

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Salmonella infections in the newborn carry special significance as they are associated with higher attack rate, morbidity and mortality. The occurrence of septicemia has been reported in 5% cases of all salmonella infections(l). *S. typhimurium* is the most common causative agent of nursery outbreaks amongst the nontyphoidal salmonella serotypes, the others being *S. anatum, S. newport, S. oranienberg, S. zveltervreden, S. senftenberg and S. alachua(2).*

Salmonella bareilly remains a rare causative organism in neonatal unit outbreaks. Only two epidemics have been reported in the last three decades(3,4) and diarrhea has remained as the leading symptom. This communication describes the clinical features and outcome of five cases of neonatal septicemia caused by *S. bareilly*. Interestingly, none of these had diarrhea.

Subjects and Methods

The present study is based on five neonates having *S. bareilly* septicemia admitted to the Neonatal Unit of GTB Hospital. Since all the cases occurred within 24 days; a common source was suspected. A detailed microbiological examination of the nursery environment was carried out. Stool cultures of all the newborns, mothers and staff were obtained. Complete sepsis screen was done on all symptomatic newborns. Following the epidemic, nursery was shut down and fumigated. The organism was serotyped at the National Salmonella and Escheriechia Center, CRI, Kasauli.

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Results

The clinical features of babies are depicted in *Table I.* All babies were preterms, delivered normally and sustained mild tc moderate asphyxia. Bottle/tube feeding with expressed breastmilk was commenced as soon as their condition stabilized. The symptoms appeared only after one week of nursery stay. The complications encountered included shock and apneic spells (one case each). None of the newborns had meningitis. The organism was sero typed and identified as 6,7:Y:1,5. It was uniformly resistant to ampicillin, gentamicin, cephalexin, cotrimoxazole, netilmicin and cefotaxime and sensitive to chloramphenicol and ciprofloxacin. However, the sensitivity report was received after we had started antibiotics which showed good response. A combination of cefotaxime (100 mg/kg/day) and amikacin (15 mg/kg/day) was successfully used for a period of 10 to 14 days in 4 out of 5 babies. However, the baby with shock died within 72 hours of starting therapy. Stool cultures of all the neonates did not reveal any organism. The organisms was traced to the rubber pipe attached to a foot suction machine. Rest of the environmental survey did not yield anything significant. Outbreak was controlled after the nursery was temporarily closed and thoroughly fumigated.

Discussion

S. bareilly was first isolated in our nursery from blood, pus and stool of a single

TABLE I–*Clinical Profile of the Newborns with S. bareilly Septicemia.*

Sl. No.	Sex	Gestational age (wks)	Birth weight (kg)	Apgar Score (1,5 min)	Preceding illness	Day of Onset	Presenting features	Outcome
1.	M	36	1.9	6,7	Congenital pneumonia	13	Pallor, respiratory distress, sclerema, acidosis	Improved
2.*	F	35	1.7	not known (cried 15 min after birth)	Congenital pneumonia	8	Prefeed aspirates, vomiting, conjugated Hyperbilirubinemia	Improved
3.	F	34	1.25	6,7	HMD	9	Pallor, sluggishness, hypothermia, cyanosis, sternal abscess, shock	Died
4.	F	36	1.65	3,8	2nd twin, breech	6	Refusal to feed, sluggishness, conjugated hyperbilirubinemia, abdominal distension	Improved
5.*	F	34	1.5	not known	HMD	8	Pallor, sluggishness, abdominal distension prefeed aspirates, apneic spells	Improved

* These babies were delivered at home. Case 2 had a history of maternal fever and prolonged leaking (> 48 h) per vaginum.
HMD-Hyaline membrane disease.

neonate, who had contracted the organism from his mother(5) three months prior to the present outbreak. The foot suction machine used for that patient remained unused for the next two and half months. At this juncture, due to failure of other electrical suction units, the machine was again pressed into service. Exactly after two weeks, the first case of *S. bareilly* septicemia was detected. Occurrence of the present outbreak suggests that the organism has the capability to lie quiescent for weeks together and rejuvenate once appropriate conditions are provided. Earlier *S. bareilly* has been shown to survive in stored tap water for as along as 14 days(4).

The biggest epidemic of *S. bareilly* septicemia occurred in a Sri Lanka hospital affecting 55 prematures with a death rate of 21.8%. Most of the neo nates presented with diarrhea and the source of infection was traced to the piped water supply(4). Infection of premature neonates with *S. bareilly* was reported for the first time in India in 1983(3) and till date this was t he only documented epidemic of neonatal *S. bareilly* infection reported from this country.

The clinical picture in our patients was nonspecific and merely suggested neonatal sepsis. Diarrhea, the most common presenting feature in earlier reported cases, was conspicuously absent in these cases. Infection occurring towards the middle of second week of nursery stay clearly indicated a nosocomial spread.

S. bareilly (6,7:Y: 1,5) responsible for the disease in the present series has been identified with neonatal infections earlier also(3). The strain, though *in vitro* multi drug resistant, responded to a combination of cefotaxime and amikacin *in vivo*. Therefore, the antibiotics were administered based on the clinical response rather than the sensitivity reports. However, in the case who died, antibiotics were changed to ciprofloxacin after the child did not show any improvement to cefotaxime and amikacin even after 48 hours. Unfortunately, the child was terminally ill and died on 3rd day of illness.

The suction machine used in the present context underwent a thorough disinfection. The glass jars were washed with detergent and autoclaved. All the plastic and PVC connections were replaced with the new ones. Nurses were instructed to enforce the use of separate suction catheter for each baby and cleaning and washing of glass jars with anionic detergent in each shift. Frequent autoclaving was practised and need for strict aseptic nursing technique was re-emphasized. Routine microbiological vigilance of all these equipments was made part of the standard asepsis maintenance protocol of the nursery. These precautions, if strictly adhered to, may help in prevention of similar outbreaks in future.

REFERENCES

1. Jain SC, Bhakoo ON. Salmonella infection in the newborn. A review (with special reference to nursery epidemics). Indian Pediatr 1979, 7: 629-635.
2. Gupta P, Ramachandran VG, Sharma PP, Faridi MMA, Talwar V, Mathur M. *Salmonella senftenberg* septicemia: A nursery outbreak. Indian Pediatr 1993, 30: 514-516.
3. Aggarwal P, Sarkar R, Singh M, Grover BD, Anand BR, Raichowdhuri AN. *Salmonella bareilly* infection in a pediatric hospital of New Delhi. Indian J Med Res 1983, 78: 22-25!
4. Mendis NMP, Dela Motte PN, Gunatillaka PDP, Nagrarnam W. Protracted infection with *Salmonella bareilly* in a maternity hospital. J Trop Med Hyg 1979, 79:142-150.
5. Gupta P, Talwar V, Earidi MMA, Mathur M, Mahajan M. Neonatal polyarthritis caused by Salmonella bareilly. Indian Pediatr 1996, 33: 341-342.