

PREVALENCE OF BACTERIURIA IN FEBRILE INFANTS

V.R. Dharnidharka
Pravina W. Kandoth

ABSTRACT

Urine samples from 129 admitted febrile infants were collected using the suprapubic aspiration technique, and subjected to routine urinalysis, culture, and antibiotic sensitivity testing. Most of the infants suffered from respiratory tract infections ($n = 80$) and gastroenteritis ($n = 25$). Sixty nine patients were male and sixty female.

In all, 7 patients had positive cultures (5.4%), indicating a high yield ($> 5\%$). Six of these were female and occurred in patients with gastroenteritis ($p < 0.05$ for both by χ^2 and Z test). Four patients showed pus cells and organisms on smear, and all of them were culture positive. Another three had only pus cells, but were also culture positive. One patient each, who had pus cells only or organisms only on smear had no growth on culture. *E. coli* was grown in 6 of the cases, and *Klebsiella* in one. All cultures were sensitive to ciprofloxacin. Variable sensitivity was seen with gentamicin, streptomycin, and furadantin. The organisms were uniformly resistant to ampicillin and chloramphenicol. The procedure of suprapubic aspiration was safe with no complications.

Our findings indicate that bacteriuria is not uncommon in febrile infants even with clinical evidence of other illnesses and that female children, especially those with gastroenteritis, are at most risk. Routine urine cultures in such patients would appear justified.

Key words: Bacteriuria, Urinary tract infection.

Infants represent a higher risk group among children with urinary tract infection (UTI). They are unable to voice symptoms which localize infection to the urinary tract. Their relatively immature kidneys are more prone to long term serious damage from infection(1,2). Studies carried out abroad have shown that routine urine cultures in febrile infants with clinical evidence of other illnesses give high positive yields (3-5). A recent study by us on febrile children also showed the same(6). We, therefore, carried out this study to ascertain the prevalence of bacteriuria in febrile Indian infants with a clinical diagnosis other than UTI.

Material and Methods

Urine samples from 129 febrile infants (temperature $\geq 38.4^\circ\text{C}$), without clinical evidence of UTI were collected by suprapubic aspiration. They were then subjected to microscopic analysis for pus cells and bacteriuria, culture and antibiotic sensitivity testing. Growth of a single species of Gram negative bacilli in any number, or Gram positive cocci $> 10^3/\text{ml}$, was taken as significant bacteriuria, as per Glass(7). A 'high yield' was deemed to be present if $> 3-5\%$ of cultures yielded significant growth(4).

Results

Of the 129 infants, 69 were males and 60 females which included 5 male and 4 female neonates. Reasons for admission were as shown in Table I. Overall, 7 out of 129

From the Department of Pediatrics, T.N. Medical College and B.Y.L. Nair Ch. Hospital, Dr. A.L. Nair Road, Bombay 400 008.

Reprint requests: Dr. V.R. Dharnidharka 124, Basant Apts, Cuffe Parade, Bombay 400 005.

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Table I—Relationship of Bacteriuria with Clinical Diagnosis

| Illness | Total | Positive |
|----------------------------------|-------|----------|
| Respiratory infections | 80 | 1 |
| Acute gastroenteritis | 25 | 6* |
| Central nervous system infection | 5 | 0 |
| No clinical signs (? sepsis) | 19 | 0 |
| Total | 129 | 7 |

* $p < 0.05$.

patients (5.4%) had positive urine cultures, with all samples showing growth of greater than 10^5 /ml of a single species. Multiple growth was not seen in any case.

Six out of the 7 positive cases were females, and all of them had gastroenteritis. One positive case was seen in a male with pneumonitis. The female sex predilection and higher incidence with gastroenteritis were both significant ($p < 0.05$) by the χ^2 and Z tests.

All the positive cases had abnormalities on microscopic urinalysis. Four patients had both pus cells and bacteriuria on smear; the remaining 3 had only pus cells. An additional 1 patient each had either pus cells or bacteriuria on smear, but were culture negative.

E. coli was grown in all 6 cases of gastroenteritis. The male neonate with pneumonitis grew *Klebsiella aerogenes*. Both the organisms were uniformly resistant to ampicillin and chloramphenicol. Variable sensitivity was seen to gentamicin, streptomycin and furadantin. All the cultures were uniformly sensitive to ciprofloxacin.

The procedure of suprapubic aspiration had a high success rate and was safe, with no complications seen in our series.

Discussion

Over a quarter century ago, North(8) recognized that acute febrile illness in infants might indicate hidden UTI, but he dismissed this notion as he could find no growth in 26 consecutive urine samples. Larger and more recent studies(3-5) have refuted this; a significant growth was documented in 4.1 to 7.5% of febrile infants, representing a high yield. Our figure of 5.4% is also within this range.

Culture positive rates in febrile neonates have ranged from 0.14 to 1.5%(9). We had one positive culture out of 9 neonates in our series. It is difficult to compare our data as the number of neonates in the present study was very small. There is a definite male preponderance for bacteriuria in the neonatal period(10), which changes to a female preponderance during infancy(3,7). The only neonate of ours with a positive culture was a male.

Most of these infants had a clinical diagnosis other than UTI, such as respiratory infection, gastroenteritis, otitis media, or central nervous system infection, as shown by Bauchner *et al.*(3). In our series also, respiratory infections, gastroenteritis and sepsis were the common clinical diagnosis. UTI in these patients probably represents a spread of infection from the initial site to the urinary tract. The organisms grown in our study, *E. coli* and *Klebsiella*, appeared to correspond well with the initial clinical focus of infection in these patients, *i.e.*, gastroenteritis and respiratory infection, respectively. Six of the 15 female infants admitted with gastroenteritis showed positive cultures (40%). However, larger studies of this subgroup are required to confirm this high percentage. It is possible that gastroenteritis may have also been the effect, as many infants with UTI present with gastroenteritis.

The method of collection used plays a major role in the results obtained in the study. Edelmann *et al.* (11) and Aronson *et al.* (12) could confirm bacteriuria by suprapubic aspiration in only 7.5 and 42%, respectively. The use of clean voided or bag samples gives only an 80% probability of infection with just one positive sample $>10^5$ /ml, whereas with suprapubic aspiration this probability increases to 99%, and with any colony count of Gram negative bacilli (7). In a previous study, we found that clean catch samples in febrile children yielded a positive culture rate of 10.78% (6). In view of the possibility of contamination, we used only suprapubic aspiration in this study with excellent results.

Microscopic urinalysis was highly sensitive (100%) and specific (98.3%) for detecting significant bacteriuria. Only 2 cases showed an abnormal urinalysis with negative cultures which was possibly a laboratory error. The results re-emphasize the value of a proper urinalysis.

E. coli was consistently shown to be the predominant organism in all the other studies (3-5), in complete accordance with our data. *Klebsiella*, *Proteus mirabilis*, *Staph. epidermidis* and enterococcus have also been isolated by other workers.

All the organisms were uniformly resistant to chloramphenicol and ampicillin, with variable sensitivity to gentamicin and furazolidant, suggesting a need to do repeat urine cultures to confirm bacteriological cure. Uniform sensitivity was seen with ciprofloxacin, but the use of this drug in infants for such conditions is controversial. Our antibiotic sensitivity reports did not include cotrimoxazole testing. Our microbiology laboratory does not do cotrimoxazole testing, as the routine Muller-Hinton medium does not give correct results with this drug. Lysed horse blood agar is needed, along with a

separate culture, and separate apparatus, for accurate results. In spite of our best efforts, we were unable to overcome this difficulty in view of the high cost of lysed horse blood agar. It is unclear whether these infections resolved spontaneously or required definite therapy, as we were unable to follow up these infants. Subsequent renal work up is also indicated to determine whether the infections affected the upper urinary tract also, which we are now attempting to do.

To conclude, the results of our study indicate that a high yield of significant bacteriuria is present in febrile infants, even with other clinical diagnoses, and that this is in accordance with previous reports. Female infants, and those with gastroenteritis, are at highest risk. Careful urinalysis is mandatory, and routine urine cultures in such febrile infants appear justified.

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NOTES AND NEWS

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