Brief Reports

Etiologic Diagnosis of Pneumonia in Under Five Children

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One-third (4 out of 15 million) of all deaths in children below 5 years of age are contributed by acute respiratory infections (ARI); of these two-thirds die in the first year of life(l). Knowledge about the etiologic agents in a particular region and the spectrum of antibiotic sensitivity is essential for formulating rational antibiotic regimens.

Cultures from the nasopharynx, throat and blood are not a reliable guide to etiology(2,3). Lung puncture provides the best way to determine the bacterial causative agent. This study was undertaken to determine the etiologic agents and assess the utility and safety of lung puncture in the diagnosis of pneumonia.

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Subjects and Methods

Eighty eight patients of ARI, under 5 years of age, admitted to the Children Hospital, Institute of Medical Sciences, Varanasi, were studied. A detailed history and clinical examination, complete blood counts and chest X-rays were done in all cases. Throat swabs were collected in 75 patients, blood cultures in 67, nasopharyngeal aspirate cultures in 44, and lung aspirate cultures in 35 patients. Lung aspiration was done according to the method described by Mimica, *et al*(4). Chest X-rays were taken 12 hours after the procedure for detection of pneumothorax. Written consent for lung tap was taken from the parents or guardians.

Antibiotic sensitivity was done for ampicillin, penicillin, chloramphenicol, cloxacillin, gentamicin, erythromycin, amikacin, trimethoprim and cefotaxime.

Results

Lung aspirate: Positive cultures were obtained in 17 out of 35 cases (48.5%). *Streptococci pneumoniae* was the commonest organism. Cases with prior antibiotic therapy did not grow *H. influenzae,* had a lower positivity rate and grew organisms like *E. coli, Proteus, Klebsiella* and *Pseudomonas (Table I). S. pneumoniae* and *H. influenzae* were sensitive to all antibiotics. All other bacteria were resistant to penicillin, chloramphenicol and trimethoprim, but sensitive to gentamicin, amikacin and cefotaxime. *S. aureus* was sensitive to cloxacillin in all cases.

TABLE I- *Results of Lung Aspirate Cultures*

Bacterial Isolate	Prior antibiotic therapy		Total
	Yes (n=27)	No (n=8)	(n=35)
S.aureus	1	1	2 (5.7)
S. *pneumoniae*	2	2	4 (11.4)
H. influenzae	1	1	1 (2.9)
Klebsiella	1	1	2 (5.7)
E. *coli*	2	0	2 (5.7)
Proteus	1	-	1 (2.9)
Pseudomonas	1	-	1 (2.9)
S. *viridans**	1	-	1 (2.9)
S. *epidermidis**	-	1	1 (2.9)
S. *albus**	2	-	2 (5.7)
*Micrococcus**	2	-	2 (5.7)
Aspirate amples with positive culture	12	5	17 (48.5)

* Did not occur singly

\+ Reported as contaminants

Figures in parenthesis represent %ages.

Blood Culture was positive in 13 out of 67 cases (19.5%). Concordance with lung aspirate was seen in only 2 cases of *S. aureus* infection. Throat swab culture was positive in 25.3% cases. Identical organisms were isolated from lung aspirate and throat swab in 2 patients (one each with S. *pneumoniae* and *Klebsiella).* In nasopharyngeal culture potential pathogens were isolated in 20.5% cases; identical organism was isolated from lung aspirate in one case of P. *mirabilis.*

Discussion

Cultures from the nasopharynx, throat and blood, although easy to collect, are not reliable(2,3). The degree of concordance between isolates from the upper respiratory tract and lungs was poor in this study. Infact, it has been argued that these isolates have no etiological value(5).

Similarly, blood culture and lung aspirate culture grew identical organisms in only 2 cases. The blood culture positivity rate was 19.5%; rates varying from 17 to 36% are reported by other workers(2,5). The low concordance of blood and lung aspirate cultures have been reported by others too(5,6). The low blood culture positivity in our patients could be due to prior antibiotic therapy.

Lung aspirate cultures are likely to be etiologically important as the lung is normally sterile(7). The positivity rate of lung puncture aspirate in this study was 48.5%. Patients not receiving prior antibiotic therapy showed positive cultures in 62.5% cases which is comparable to previous reports(4,6,8,9). The low overall positivity could be due to: *(a)* previous antibiotic treatment, *(b)* needle missing the infective focus, (c) viral etiology and *(d)* inadequate culture methods for anaerobes. Isolation of *E. coli, Pseudomonas* and *Proteus* sp. indicate their importance as etiologic agents in severe pneumonia. Similar findings were also reported by Mishra *et al(10).*

Our results suggest that culture of the lung aspirate is the preferred method for etiologic diagnosis in pneumonia. It is especially useful in cases with well defined pneumonia which are not responding to routine microbial therapy. The procedure is relatively safe provided appropriate precautions are taken.

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