pneumonia. Although the penicillinase-resistant penicillins are not the drugs of choice in the management of pneumococcal infections, their efficacy in pneumococcal disease needs further evaluation because of the frequent difficulty in distinguishing between staphylococcal and pneumococcal pneumonia in infants and children.

ANTIBIOTICS IN CYSTIC FIBROSIS

A. P. Norman
Hospital for Sick Children, Great Ormond Street, London, W.C.1.

In cystic fibrosis the main problem is the susceptibility of the children to respiratory infection. The clinical course of the untreated case is one of repeated respiratory infections followed by persistent pulmonary sepsis, and later death. Severe attacks may occur in the first weeks or months of life, or less commonly, years may pass with no, or minimal symptoms referable to the chest. Upper respiratory infection is no more common nor severe than in normal children but the maxillary antra usually contain muco-pus from the early years.

The infecting organism is commonly Staphlococcus aureus, but sometimes, and very often after prolonged or repeated antibiotic therapy, Pseudomonas pyocyanea. Table I shows the bacteriological findings in 85 children with cystic fibrosis. A recent paper showed twice the incidence of coagulase positive staphilococci, three or four times the incidence of Pseudomonas pyocyanea, and an equal incidence of haemophilus organisms in cystic fibrosis as compared to similar groups of children with acute and with chronic respiratory infection. (Iacocca, Sibinga and Barbero, 1963).

It is likely that the type of infecting organism simply reflects the incidence of pathogenic organisms in the local environment of the child, but unlike the normal child, the child with cystic fibrosis is unable to get completely rid of the infection once it has occurred and hence permanent lung damage is the usual sequel.

A possible reason for this is the production by the child with cystic fibrosis of an excessive amount of sticky mucus in response to infection. It is possible, but it is less likely than was once thought, that there is a chemical abnormality in the mucus itself, causing it to be excessively viscid.

### TABLE I

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Coagulase positive staphylococcus ... 41</td>
</tr>
<tr>
<td>&quot; negative &quot;</td>
</tr>
<tr>
<td>Pseudomonas pyocyanea ... 17</td>
</tr>
<tr>
<td>Proteus spp. ... 10</td>
</tr>
<tr>
<td>Esch. Coli ... 6</td>
</tr>
<tr>
<td>Klebsiella ... 5</td>
</tr>
<tr>
<td>Haemolytic streptococci group A ... 7</td>
</tr>
<tr>
<td>Haemolytic streptococci non group A ... 4</td>
</tr>
<tr>
<td>Strept. faecalis ... 3</td>
</tr>
<tr>
<td>Strept. pneumoniae ... 2</td>
</tr>
<tr>
<td>Haemophilus group ... 6</td>
</tr>
<tr>
<td>Candida spp. ... 3</td>
</tr>
<tr>
<td>Aspergillus spp. ... 1</td>
</tr>
<tr>
<td>Commensals only ... 18</td>
</tr>
<tr>
<td>No recent culture ... 4</td>
</tr>
</tbody>
</table>

### TABLE II

<table>
<thead>
<tr>
<th>Sensitivities of 41 Coagulase Positive Staphylococci isolated from Children with Cystic Fibrosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin sensitive ... 12</td>
</tr>
<tr>
<td>Penicillin sensitive ... 6*</td>
</tr>
<tr>
<td>Penicillin resistant ... 25*</td>
</tr>
</tbody>
</table>

(* all but one of these organisms were methicillin sensitive)

The earlier forms of penicillin were relatively ineffective in the treatment of cystic fibrosis and as can be seen in Table II only 12 of 41 infecting staphylococci were fully sensitive to pencillin G. Antibiotics, such as the tetracyclines and erythromycin gave the first real chance of effective active and preventive treatment of the staphylococcal infection. With the advent of the synthetic penicillins, methicillin has proved extremely effective both clinically and bacteriologically in clearing the staphylococcus from the sputum. Cloxacillin
although it has the advantage of being given orally, seems less effective, and ampicillin similarly. Comparative statistical evidence of the value of the various penicillins and of the antibiotics is not available, and would be difficult to obtain, but I have no personal doubt that at present in the acute infection methicillin and chloramphenical are the two most effective drugs.

A major anxiety is the development of bacterial resistance in the child with repeated or persistent infection. This develops sooner or later in all these children and makes the continued prophylactic use of antibiotics unwise.

An antibiotic free from this drawback would be of the greatest value: in about 12 children with cystic fibrosis treated for up to one year with daily fucidin I have as yet had no case of drug resistance. But this may in any case not develop with any drug given prophylactically for a year or more.

For the pseudomonas there appears to be no answer at present, whether the antibiotic is given by mouth, injection or by aerosol.

REFERENCES


PENICILLINASE RESISTANT PENICILLINS IN THE TREATMENT OF SURGICAL STAPHYLOCOCCAL INFECTIONS

ALEXANDER M. RUTENBURG

Beth Israel Hospital, 330 Brookline Avenue, Boston 15, Massachusetts

The development of a unique series of synthetic penicillins resistant to hydrolysis by penicillinase has permitted effective control of staphylococcal disease.

We have used four of these new penicillins (methicillin, naftcillin, oxacillin and cloxacillin) in the treatment of about 500 patients with staphylococcal infections, half of whom had failed to respond to therapy with other antibiotics.

Staphylococci resistant to penicillin G alone or along with other micro-organisms were cultured prior to new penicillin therapy in all patients. Patients with well localized areas of suppurating without systemic reaction or without evidence of spreading infection who could be expected to respond to incision and drainage only, were not included. The conditions treated can be summarized under the following classifications:

1. Primary soft tissue infections.
2. Post-operative wound infections.
3. Intra-abdominal sepsis.
4. Infections complicating peripheral vascular disease.
5. Lower respiratory tract infections.
7. Septicemia.

8. Osteomyelitis.

Results were evaluated on a clinical and bacteriological basis. Criteria for a good result were: subjective improvement, defervescence within 48-72 hours, return of the elevated leukocyte count to normal, sterilization of an infected nidus such as wound exudate, urine, sputum or blood and wound healing.

If these responses were not elicited the result was considered poor. Seventy-eight per cent of patients with a variety of staphylococcal infections responded to therapy with the new antistaphylococcal penicillins.

For the purpose of this discussion I should like to deal in greater detail with the use of the new penicillins in the treatment of staphylococcal enterocolitis, septicemia and certain types of soft tissue infections.

Enterocolitis

Thirteen patients with staphylococcal enterocolitis had received prior broad spectrum antibiotic therapy either in the form of tetracycline or neomycin sulfate and phthalylsulfathiazole (Sulfathalidine) for preoperative bowel preparation. All were dehydrated and had
Antibiotics in Cystic Fibrosis

A. P. Norman

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