ing *H. influenzae,* the commonest meningeal pathogen.

It is that the same may not be applicable to other pathogens. For example ampicillin achieves a CSF concentration 198 times the MIC of pneumococcus. As expected theoretically, studies have shown beneficial effects when steroids were added to ampicillin plus chloramphenicol for treating pneumococcal meningitis(2).

One of the side effects of steroids is the delayed sterilization of CSF. Hence an antibiotic like ceftriaxone which rapidly sterilizes CSF(2) is required when steroids are used. In addition is the possible problem of plasmid mediated resistance of *H. influenzae* to both ampicillin and chloramphenicol(2) in which case steroids can be hazardous.

Thus it seems reasonable to restrict the use of steroids to cases of *H. influenzae* meningitis only when ceftriaxone is prescribed.

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REFERENCES

1. Singhi PD. Recent trends in the management of acute bacterial meningitis. Indian Pediatr 1994, 31:1321-1326.
2. Levin M, Heyderman RS. Bacterial meningitis. *In:* Recent Advances Pediatr No. 9. Ed. David TJ. London, Churchill Livingstone, 1991, pp 1-19.
3. Arditi M, Abies L, Yoger R. Cerebrospinal fluid endotoxin levels in children with *H. influenzae* meningitis before and after administration of intravenous ceftriaxone. J Infect Dis 1989,160:1005-1011.

Reply

Dexamethasone is recommended as adjunctive therapy in meningitis as it minimizes the host inflammatory response and its adverse neurological consequences. This inflammatory response is elicited by the presence of bacteria and their components in the subarachnoid space, and occurs even before the administration of antibiotics which may augment the response as they cause bacterial lysis. Dexamethasone is used to attenuate this inflammatory process as well as prevent its augmentation after antibiotic administration.

The two early clinical trials in which ampicillin and chloramphenicol were used and which did not demonstrate any significant benefit of steroids have been criticized(l), as in one(2) methylprednisolone (which may not be as effective as dexamethasone in this setting) was used, and in the other(3) the dose of dexamethasone used was significantly lower than that used in more recent studies.

Since in developed countries the choice of initial antibiotics for meningi-

tis has shifted to third generation cephalosporins, the recent trials have included these. However, ^n a large recent trial from Egypt involving 429 patients, dexamethasone was used alongwifh a combination of ampicillin and chloramphenicol(4). The overall mortality was significantly lower (p <0:01) in the dexamethasone group (10%) than in the group receiving antibiotics alone (19%). The incidence of neurological sequelae was also lower in the dexamethasone group (2%) than in those who did not receive dexamethasone (4%). Although pneumococcus was the predominant organism in this study, and the differences were particularly significant for pneumococcal meningitis, there were considerable number of cases of *H. influenzae* and *N. meningitidis*.

In a very recent trial, wherein ampicillin or penicillin and chloramphenicol were used, a two day regimen of dexamethasone was equally effective as the four day regimen(5). In this study, 50% of the cases were due to *Neisseria meningitidis* and 40% to *H. influenzae.* In some cases of ampicillin resistant *H. influenzae* the antibiotic was changed to cefotaxime whereas in others chloramphenicol was continued. However, the clinical response was similar regardless of whether conventional antimicrobial therapy or cefotaxime was administered. Other than mild gastrointestinal bleeding no significant adverse effects of steroids were reported.

Although theoretically it is possible that steroids may delay CSF sterilization, this has not been reported in any of the studies where this was looked for(3,5-9) including the ones in which ampicillin and chloramphenical were used(3,5). Apparently use of such a short duration of dexamethasone alongwith antibiotics is not associated with delayed sterilization of CSF.

Thus it seems reasonable to use steroids even in those cases of meningitis where ampicillin and chloramphenicol are used. Fortunately, as of now the problem of *H. influenzae* resistant to both ampicillin and chloramphenicol is rare in our country. If ever it reaches significant proportions, the choice of initial antibiotics will have to be reviewed. Needless to say, that as soon as resistant bacteria *(H. influenzae* or any other) are isolated, antibiotics need to be changed. These children.as well as those with sterile cultures need close observation and follow up if they have received steroids. Since the efficacy of the two day regimen of dexamethasone is now documented(5,9), it might be prudent to restrict its use to the initial two days in such cases.

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REFERENCES

1. Townsend GC, Scheld WM. Adjunctive therapy for bacterial meningitis: Rationale for use, current status and prospects for the future, din Infect EHs 1993,17 (Suppl 2): S 537-549.
2. De Lemos RA, Haggerty RJ. Corticosteroids as an adjunct to treatment in bacterial meningitis: A controlled clinical trial. Pediatrics 1969, 44: 30-34.
3. Belsey MA, Hoffpauri *CW,* Smith MHD. Dexamethasone in the treatment of acute bacterial meningitis: the effect of study design on the interpre-

tation of results. Pediatrics 1969, 44: 503-513.

4. Girgis NI, Farid Z, Mikhail IA, Farrag I, Sultan Y, Kilpatrick ME. Dexamethasone treatment for bacterial meningitis in children and adults. Pediatr Infect Dis J1989, 8: 848-851.
5. Syrogiannopoulos GA, Lourida AN, Theodoridou MC, *et al.* Dexametha sone therapy for bacterial meningitis in children: 2-versus 4 day regimen. J Infect Dis 1994,169: 853-858.
6. Label MH, Freij BJ, Syrogiannopoulos GA, *et al.* Dexamethasone therapy for bacterial meningitis: Results of—two double-blind, placebo-controlled trials. N Engl J Med 1988, 319: 964-971.
7. Odio CM, Fairgezicht I, Paris M, *et al* The beneficial effects of early dexamethasone administration in infants and children with bacterial meningitis. N Eng J Med 1991, 324: 1525-1531.
8. Kennedy WA, Hoyt MJ, McCracken GH. The role of corticosteroid therapy in children with pneumococcal meningitis. Am J Dis Child 1991, 145: 1374-1378.
9. Schaad UB, Lips U, Gnehm HE, Blumberg A, Heinzer I, Wedgwood J. Dexamethasone therapy for bacterial meningitis in children. Lancet 1993, 342: 457-461.