Chemoprophylaxis of meningitis

‘If it is preventable, why not prevent it?’ is a legitimate starting point in the discussion of infections, particularly communicable infections. How does this aphorism stand in regard to meningococcal and Haemophilus influenzae meningitis? Although vaccines are available and licensed in the United States for protection against infection with meningococci (Sero groups A, C, Y, and W135 but not B) and H influenzae type B, they are not generally available in the United Kingdom, and prevention of these forms of meningitis relies on chemoprophylaxis.

Meningococcal meningitis has long been recognised as infectious—that is, communicable from one individual to another; worldwide epidemics are part of the published reports. The organism resides in the nasopharynx of a proportion of the population who are for the most part asymptomatic, and droplet spread is responsible for communication to other subjects, a tiny proportion of whom, susceptible in an ill understood way, develop invasive disease. Crowded living conditions, as in barracks, leads to increasing acquisition rates of meningococci and a rising incidence of meningitis. The prevention of colonisation and, by implication, invasion by meningococci, would therefore seem a rational aim, and this is the theoretical basis for the present policy of administering antibacterial agents to close contacts of known cases. Plausible though the policy appears, is it practical and does it work? It is certainly practical in the sense that drugs (rifampicin, sulphonamides, and minocycline), when administered to controls, do reduce carriage and the incidence of disease. We know that 70% of secondary cases of meningococcal meningitis occur within one week of the confirmation of the index case; it could therefore be argued that what is really happening in the context of chemoprophylaxis is that very early cases are being treated, but it should be pointed out that penicillin, which is so effective in treatment of cases, does not prevent carriage or indeed the development of invasive disease when it is used prophylactically. It may be that the pharmacodynamics of individual drugs is responsible for their usefulness or otherwise in prophylaxis. Rifampicin, sulphonamide, and minocycline reach fairly high concentrations in the saliva, whereas penicillin does not. Rifampicin or sulphonamide (where sensitive strains are present) are now recommended as chemoprophylaxis in children and adults in the following doses: rifampicin: adults 600 mg twice daily for two days, children (aged over 1 month) 10 mg/kg every 12 hours for two days, children (aged under 1 month) 5 mg/kg every 12 hours for two days; sulphadiazine or sulphadimidine 0.5–1 g every eight hours for three days. Combining rifampicin and sulphonamide effects a higher clearance rate but increases side effects.

To whom should chemoprophylaxis be offered? Certainly close family contacts, particularly those sleeping in the same room; close school contacts but not the whole class; nurses in constant close contact and perhaps medical staff only where there has been mucous membrane contact. Judgment on what other groups might be included for chemoprophylaxis may be helped by recognising that approximate relative risks for different groups are as follows: if pre-elementary school contacts represent a risk factor of 1, day care nursery contacts are 5 and household contacts are 9. A case can also be made for routine chemoprophylaxis in patients before discharge from hospital when curative treatment of meningococcal or influenzal meningitis is completed.

Turning to H influenzae type B meningitis, we note some similarities but also some striking differences from meningococcal infection. The organism responsible is the type B encapsulated strain and is again a respiratory resident, and one might conclude that outbreaks or epidemics would be well documented, but this is not so. Occasionally, instances of multiple cases of meningitis have been reported in the same family since 1909 and in the day care centres, and this led to a national study of secondary spread in household contacts in America, published in 1979. In this study Ward et al obtained prospective data in 19 states of America in which H influenzae meningitis was reported in 1403 patients, and 82% of the exposed families were investigated for the occurrence of H influenzae disease within 30 days after onset of illness in the index case. The risk to children less than 1 year old was 6%, and in those less than 4 was 2%. None of the 2624 contacts above the age of 5 was affected. The authors concluded that the risk of H influenzae disease in household contacts under 6 years of age was similar to the risk of secondary meningococcal disease in all household contacts.

It is for the most part on these American data that the rationale for chemoprophylaxis in H influenzae infections resides. We note the restricted age incidence, which makes large families, day care centres, and other areas where young children...
collect as representing special epidemiological situations deserving attention when prophylaxis is considered. Here is a major difference in regard to meningococcal infection, which, although more common in young children, attacks young adults and indeed all age groups. There are also differences between the American and the British experience. *H influenzae* meningitis is the commonest cause of bacterial meningitis in the US, resulting in perhaps 8000 cases each year. In the UK meningococci still account for the majority of notified cases, although in recent years the proportion of cases due to *H influenzae* is increasing. Although it is extremely difficult and perhaps unwise to compare statistics on meningitis, nonetheless the impression is that overall mortality is greater in the US than in the UK for *H influenzae* meningitis; in one large hospital series from Edinburgh there was not one single death in 91 cases reported from 1950–79.10

In the UK we lack precise epidemiological information on the incidence of secondary cases of *H influenzae* meningitis. The only reliable information is an unpublished survey conducted by the Public Health Laboratory Service in which only 11 instances of secondary infection were identified over a 10 year period. If this low secondary attack rate is confirmed, it suggests that meningitis due to *H influenzae* behaves differently in the UK and the US and that American experience in chemoprophylaxis (using mostly rifampicin) may have limited application in Britain. Until we have much firmer evidence, what policy should be adopted for chemoprophylaxis when confronted by an infant with *H influenzae* meningitis? Immediate contacts under 4 years might reasonably be offered rifampicin in doses of 20 mg/kg/day for four days. Two points to note about chemoprophylaxis are that doses of 10 mg/kg/day for four days have little effect,11 and that meningitis can occur even in children who have received prophylactic treatment.12 Careful clinical surveillance of susceptible infants remains paramount.

References


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