findings of fever, headache, confusion, and meningismus are present. Prompt CSF examination and culture can yield the diagnosis. Blood cultures may be positive.

The prognosis is excellent if treatment is instituted promptly. Ceftriaxone is a drug of choice, since some strains of viridans streptococci have developed penicillin resistance.

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References

Reply

Sir—We appreciate the comments of Watanakunakorn et al. about our study [1]. We agree that “viridans streptococci,” probably of oropharyngeal origin, are of interest as causative microorganisms of infections related to lumbar punctures or myelography. They are a rare but well-known cause of meningitis in this setting; fortunately, its incidence does not appear to be increasing. We have seen just 2 cases in our series and no case since 1994. None of our cases was related to myelography.

In our article we tried to explain some aspects of streptococcal meningitis and the epidemiological changes in the past several years, but certainly there are several interesting aspects that we did not treat exhaustively. With regard to streptococcal meningitis cases related to lumbar puncture or myelography, we think the most important issue might be elimination of certain risk factors; however, some strategies such as the use of a facial mask while performing the lumbar puncture remain controversial [2, 3].

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Age-Related Differences of Nontyphoid Salmonella Bacteremia in Clinical Presentation and Outcome: Association with Specific Serovars but Not Necessarily with the Virulence Plasmids

Sir—Shimoni et al. [1] retrospectively analyzed clinical data for patients with nontyphoid salmonella infections in Israel and found age-related differences in clinical presentation, bacteriology, and outcome between pediatric and adult patients. We have performed a similar study [2] and would like to clarify some points that were not clearly addressed in their article.

First, simply on the basis of clinical presentations and evidence of pulmonary infiltrates on chest radiographs, Shimoni et al. reported that the lung was the most common extraintestinal site of nontyphoid salmonella infections. To come to such a conclusion without the support of microbiological data is inconsistent with scientific standards. Cases of pneumonia caused by Salmonella are extremely rare in the literature [3], and in the past decade, we are aware of only 1 reported case, which occurred in a child with immunodeficiency [4].

Their report on the difference in the serogroup distribution in the 2 age groups is interesting. However, it is not surprising that more Salmonella enteritidis infections occurred in adults, because this serovar, like another serovar, Salmonella choleraesuis, usually causes primary bacteremia without preceding gastroenteritis in patients who have underlying diseases [2, 3]. On the other hand, the reason for the predominance of infections due to group C Salmonella strains (mostly Salmonella virchow and Salmonella infantis) in children in their study remains unclear. It might have resulted from the consumption of contaminated milk [5]. In Taiwan, most group C Salmonella infections are prevalently caused by S. choleraesuis, and these infections occur invariably in adults [2]. The most common serovar isolated from children is Salmonella typhimurium; in our study [2], secondary bacteremia due to this serovar sometimes developed after an episode of gastroenteritis. Such serovar distribution is consistent with the clinical finding that most

References

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adult patients present with primary bacteremia, whereas pediatric patients present with secondary bacteremia [1, 2].

The speculation of Shimoni et al. regarding the possible association of the virulence plasmid with bacteremia in humans is misleading. If it were true, we should see a predominance of bacteremia caused by the virulence plasmid–carrying strains of Salmonella in either immunocompromised or immunocompetent patients. This predominance was simply not observed in our study [6]. Their suggestion that “this decreased invasiveness of S. agona may be explained by the absence of virulence plasmids” is wrong and in fact not supported by the 2 reports that they cited [7, 8]. All would agree that chromosomal virulence genes, rather than the virulence plasmid, are the most important microbial determinants for the virulence phenotype of nontyphoid Salmonella in humans. For example, Salmonella typhi and Salmonella paratyphi are highly pathogenic for humans but harbor no virulence plasmids. Furthermore, Salmonella gallinarum/Salmonella pullorum and Salmonella abortus ovis carry a virulence plasmid but are not pathogenic for humans.

To date, there has been no compelling evidence to support the involvement of the virulence plasmids in the pathogenesis of nontyphoid Salmonella in humans, although the plasmids are important for these serovars to cause systemic infections in their specific hosts. Fierer et al. [7] examined 121 clinical isolates of S. typhimurium and found that 42% of the fecal isolates and 76% of the blood isolates hybridized with a probe prepared from the vir region of the virulence plasmid of Salmonella dublin; therefore, it was speculated that the virulence plasmid of S. typhimurium, which has been shown to be involved in virulence in mice, also facilitates the bacteria to cause systemic infections in humans. The evidence provided by Fierer et al. seems incomplete, since the number of strains tested was small, no other serovars were evaluated, and the role of host factors was not checked. Moreover, the probe used for the hybridization assay was derived from the virulence plasmid of S. dublin and not from that of S. typhimurium. Although the virulence plasmids of nontyphoid Salmonella all contain some homologous regions, they are still substantially different from each other [9, 10].

Recently, by using a specific multiplex PCR assay, we examined 436 clinical isolates of various Salmonella serovars [2, 6]. The results showed that all those serovars preferentially causing primary bacteremia, such as S. choleraesuis, S. dublin, and S. enteritidis, harbor a virulence plasmid, whereas, except for S. typhimurium, those that only occasionally cause secondary bacteremia do not harbor a virulence plasmid. However, the rates of carriage of a virulence plasmid in S. typhimurium were not statistically different between nonfecal and fecal isolates. These observations indicate that the virulence plasmid may play a role in primary bacteremia but not in secondary bacteremia. More studies are needed to elucidate the real role of the virulence plasmids of nontyphoid Salmonella involved in human infections.

References


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Reply

Sir—We thank Chiu et al. for their interest in our article [1]. We are pleased to learn that they have similar observations for their patient population. We do not agree that pulmonary involvement is a rare event in nontyphoid salmonella bacteremia. In a report from Taiwan by Lee et al. [2], the most common complication in 64 patients with bacteremia due to non-typhi Salmonella was pneumonia, which occurred in 27% of children aged <24 weeks, 18% of children aged 6 months to 2 years, and 28% of adults. In another report by Galofrè et al. [3], lung