Clinical Condition Affects Hearing Loss in Meningitis

BY DENISE NAPOLI

Patient age and presenting status—not dexamethasone or glycerol treatment—have the greatest impact on whether a child with bacterial meningitis will develop hearing loss, even in cases due to *Haemophilus influenzae* type b, according to the largest clinical trial yet to tackle the question.

Indeed, "the effect of the clinical condition was so dramatic that each lowering point in the Glasgow Coma Scale increased the risk of hearing impairment by 15%-20%," the study authors wrote.

Dr. Heikki Peltola of the division of pediatric infectious diseases at Helsinki University Central Hospital and associates conducted a prospective, randomized double-blind trial of bacterial meningitis patients aged 2 months to 16 years from 10 Latin American institutions (Pediatrics 2010; 125:e1-8).

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Major Finding: Whether a child with bacterial meningitis had hearing loss depended on patient age and presenting status. Dexamethasone and glycerol treatment did not appear to be helpful.

Data Source: A prospective, randomized double-blind trial of 383 children.

Disclosures: Dr. Peltola disclosed that he currently serves as a clinical scientific consultant for Serum Institute of India Ltd. GlaxoSmithKline organized the first grant for this study. Dr. Yogev and Dr. Pelton said they had no relevant financial disclosures.

Children included in the study had positive cerebrospinal fluid (CSF) or blood cultures for meningitis, or negative cultures with signs and symptoms of the disease plus three out of four criteria: pleocytosis, a CSF glucose level less than 40 mg/dL, a CSF protein level greater than 40 mg/dL, or a serum C-reactive protein level greater than 40 mg/dL.

Children with a recent head injury, a prior neurologic disease or procedure, immunosuppression, or a known hearing impairment were excluded from the study.

Of the 654 who entered the study, 83 died and 188 were insufficiently tested, leaving 383 children available for analysis.

Most (146) had meningitis due to *H. influenzae* type b (Hib), followed by *S. pneumoniae* (70 cases).

All children received ceftriaxone; then 101 children received adjuvant intravenous dexamethasone, 95 received dexamethasone plus glycerol, 92 received glycerol only, and 95 received placebo only.

Mild hearing impairment (between 41 and 59 dB) was detected in 44 children, moderate to severe impairment (between 60 and 79 dB) was detected in 46 children, and severe impairment (80 dB) was detected in 27 children; 15 children became totally deaf.

Regardless of the threshold level, treatments did not differ from each other or placebo in terms of effect on hearing loss.

Nor did etiology correspond to hearing loss.

"Ineffectiveness of all adjuvant medications remained essentially the same when cases with and without a proven etiology were examined," Dr. Peltola and associates said.

Age, however, did play a role.

"Each increasing month of age decreased the risk of hearing impairment by 2%-6% for any, moderate to severe, and severe impairment," the physicians noted.

"The controversy about dexamethasone therapy for *Streptococcus pneumoniae* is well known, but we all believed that the role of dexamethasone in *Haemophilus influenzae* meningitis had been established," Dr. Ram Yogev and Dr. Stephen Pelton stated in an accompanying editorial.

"Yet, the data … fail to demonstrate a benefit for dexamethasone in any bacterial meningitis (including *H. influenzae*) and raise questions about past beliefs," they said.

In the editorial, Dr. Yogev of the division of pediatric infectious diseases at the Children's Memorial Hospital, Chicago, and Dr. Stephen Pelton of the division of pediatric infectious diseases at Boston University Hospital pointed to the most recent Cochrane meta-analysis, which states that "data support the use of adjunctive corticosteroids in children in high-income countries" (Pediatrics 2010;125;e188-90).

"We suggest that the delay from onset of infection to the start of appropriate therapy (permitting progression of the inflammatory response) is an important contributor to the failure of current adjunctive therapies in resource-limited countries," they wrote, adding, "If adjunctive therapies are only effective before the inflammatory cascade is operational, they will never be fully successful."

They also pointed out that the percentage of patients who experienced hearing loss in this study—roughly one-third—is "higher than in many of the studies in which beneficial outcomes with dexamethasone were observed, possibly suggesting a cohort with more advanced disease or a late diagnosis."

Dr. Yogev and Dr. Pelton concluded with the observation that this study "reminds us that we are still far from preventing many sequelae of childhood bacterial meningitis." ■