Spatial Listening in Adolescents with a History of Otitis Media with Effusion

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Abstract

The spatial listening abilities of 20 adolescents with a history of otitis media with effusion (OME) were assessed. A specific deficit in identifying target sentences in the presence of spatially separated competing speech was found. Conversely, sentence identification in the presence of spatially coincident competing speech was not significantly impaired. These findings contrast with reports of a disappearance, by adolescence, of any central auditory processing (CAP) deficits secondary to childhood OME, and have implications for CAP as well as OME.

Methods

Participants
- Twenty individuals aged 13 to 17 with a history of OME meeting criteria for surgical insertion of ventilation tubes (two medically documented episodes of OME at least three months apart)
- English as first language
- Hearing within normal limits at all octave frequencies (250 – 8000 Hz) at the time of testing
- No indication of middle ear infection or effusion at time of testing
- No known history of cognitive delay or neurological disorders

Background and Rationale

“Spatial listening” refers to the ability to attend to an acoustic signal from a particular spatial location, in preference to competing signals from other locations. It relies to a large extent on binaural hearing, and on the central auditory processing (CAP) of differences in the acoustic signals received by the two ears. Deficits in spatial listening represent one class of central auditory processing disorder (CAPD) and, like other forms of CAPD, may have a significant impact on language learning and broader educational and social consequences for children as well as adults.

Several studies have indicated that childhood OME may have persistent effects on aspects of children’s central auditory processing (CAP) and language abilities, even after the condition has resolved. The literature generally indicates, however, that such effects are less apparent in older children and adolescents than in young children. In particular, subsequent to childhood OME, performance on CAP tasks involving binaural hearing has been reported to improve to within normal limits before or during teenage years (e.g. review by Roberts et al., 2004).

We have previously reported (AudiologyNOW!/CAPD conference 2012) that young children with a history of OME show a deficit in spatial listening – such children performed significantly more poorly than norms in identifying target sentences in the presence of spatially separated, but not spatially coincident, competing speech.

This study examines spatial listening in older children (adolescents) with a history of OME. Our hypothesis, based on the weight of evidence in the literature, was that spatial listening deficits would not be apparent in these older children, despite their history of OME.

Results

Participants did not perform significantly more poorly than norms when competing and target speech were spatially coincident, and in the same voice (Figure 2, p = 0.72).

Spatial listening was assessed using the Listening in Spatialized Noise–Sentences (LiSN-S) test (Cameron & Dillon, 2007). Figure 1 shows the test conditions and measures of interest to this study. All scores were converted to age-adjusted standard scores, tested for normality and compared to norms using one-sample t-tests with a test value of 0.

Discussion and Conclusions

These results indicate that spatial listening deficits secondary to OME may be more persistent than is suggested by past work on binaural hearing.

One possible reason for the apparent contrast in our findings with previous related literature is the difference in relative complexity of the listening tasks involved. This may be consistent with the conclusions of Hall et al (1998), that children with a history of OME may show a slower recovery of auditory function for more complex listening tasks. Therefore, the identification of any residual deficits in auditory function following persistent childhood OME may require auditory evaluation using relatively complex listening tasks.

More broadly, these results suggest that childhood OME may have more persistent ongoing effects on CAP than suggested by some of the literature in the field, and have implications for the management of both OME and CAPD.

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References

