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Middle Ear Infection History in Late Talkers

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Abstract:

Purpose: *This research study was designed to identify the association of middle ear functioning in late bloomers and the significance of an SLP in the diagnosis and treatment of children who were late talkers.*

Method: *The research evidence was analyzed by 20 articles which were gathered from various search engines; Google Scholar, Pub-Med, Pubs.ASHA.org etc. The framework of the introduction is built by discussing the researches from 1974-1993 in order to provide foundation and historic background for the research and the relevant research articles from 2000-2019 are highlighted to explain significance and development of our topic.*

Conclusion: *The history of the middle ear in late talkers has a large impact on language development. Early-onset otitis media (under 12 months) puts children at a higher risk of having long-term speech and language impairments.*

I. Introduction

The inflammation in the middle ear cavity, which is generally air-filled, is referred to as "otitis media". (Roberts, J. and Hunter, L., 2002). Acute otitis media (AOM), otitis media with effusion (OME; 'glue ear'), and chronic suppurative otitis media (CSOM) are all examples of OM, or middle ear inflammation (CSOM). (Anne G.M Schilder, et al., 2016).

OM is one of the most frequent diseases among young children all around the world. (Schilder, et al., 2016). Otitis media is the organic condition encountered by pediatricians. (Paradise, 1980). Infants with severe and recurrent OM, as well as persistent middle ear effusion, are at risk for behavioral issues as well as delays in speech, language, and cognitive development. (Klein, 2000). Suppurative consequences of otitis media (OM) are common in underdeveloped nations, where children have little access to medical care, and lifelong hearing loss is the outcome. (Klein, 2000). Otitis media accounts for 26% of all medical visits.(Wright,Peter F, Sell ,Sarah .H, Mc Connel ,Kathryn B. ,Sitton, Ann B, Thompson, Juliette, Vaughn, William K, Bess,Fred H 1988).Chronic otitis media patients are slower to form word combinations, have lower verbal IQ scores, show pervasive auditory processing abnormalities, and perform much worse in reading.(Zinkus and Gottlieb, 1980).After the age of four and a half, phonological processes in children with a history of otitis media tend to fade away more slowly than in children without a history of otitis media. (Roberts et al., 1988). The periodic absence of sensory input encountered during conductive hearing loss due to frequent episodes' otitis media has a long-term impact on linguistic capacity. (Zinkus and Gottlieb, 1980). The formation of normal language is thought to be dependent on good hearing (M.Drue, et, al.,1979).

The goal of OM study was to see how recurrent otitis media affected auditory perception and speaking. (Lehmann et al., 1979). Expressive language and articulatory skills were significantly lower than expected of chronological age, showing that chronic middle ear effusion may have a serious impact on speech and

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language development. (Lehmann et al., 1979). In children with a cleft palate, middle ear disease is common. (Karanth and Whittemore, 2018).A neonatal hearing screen is used to assess middle-ear disease in children with cleft palate.(Karanth and Whittemore, 2018).Cleft palate is a congenital disease caused by the failure of the secondary palatal shelves to fuse during embryogenesis. With an overall prevalence of 1 in 700 live births, CP is a very common condition. (Karanth and Whittemore, 2018).In the first 24 months, around 97 percent of children with CP have otitis media with effusion (OME), which can cause speech, language, intellectual, and emotional disabilities.(Karanth and Whittemore, 201).A retrospective study was done to compare children with an attention deficit disorder with hyperactivity (ADHD) with children with a learning disability in terms of their history of middle ear illness.(Andrew R. Adesman; Lisa A. Altshuler; Paul H. Lipkin; Gary A. Walk 1990).Middle ear disease in preschoolers has been connected to subsequent language difficulties, this study implies that middle ear disease in school-aged children may also be linked to hyperactivity and/or inattention, regardless of learning difficulty.(Adesman et al., 1990).

II. Literature Review

A study was to identify sociodemographic, pregnancy and birth, family health, parenting and child care risk factors for being a late talker at 24 months, see if late talkers still have low vocabulary at 48 months, and see if being a late talker plays a unique role in children's school readiness at60 months. (Carol Scheffner Hammer, Paul Morgan, George Farkas, Marianne Hillemeier, Dana Bitetti. 2017). Late talkers had a higher chance of having a limited vocabulary at 48 months and a lack of school preparation at 60 months. The most significant influence on children's school readiness was their family's socioeconomic position. (Hammer et al., 2017).

At 24 and 48 months, little language knowledge is particularly predictive of subsequent school readiness. Prior to starting school, young children with limited vocabularies require additional assistance.(Hammer et al., 2017).The impact of phonological working memory (PWM), home literacy environment, and a family history of linguistic impairments in late talkers, the diagnostic accuracy of a non-word repetition (NWR) task in identifying LTs, and the persistence of lexical weaknesses after 10 months were all investigated in this follow-up study.(Andrea Marini, Milena Ruffino, Maria Enrica Sali and Massimo Molteni., 2017).Late talkers demonstrated lower articulatory and naming skills, lower lexical comprehension abilities, and limited lexicon knowledge when compared to age-matched typically developing peers.(Marini et al., 2017).Based on information gathered from language inventories filled out by their parents, the relationship between language and symbolic gesture was explored in a sample of young children who were in the lowest 10% for language production for their age. Subjects responded similarly to controls matched for language production on a single scheme imitation test, which was supposed to be a gestural analogue of lexical creation. Subjects performed similarly to age-matched controls and much better than language-matched controls on a multi-scheme imitation test, which was supposed to be a gestural analogue of syntax. In the context of determinants of early linguistic success or impairment, potential reasons for this dissociation are examined. (Thal and Bates, 1988).

III. Diagnosis and Treatment

The Agency for Health Care Policy and Research published guidelines for treating OME in otherwise healthy children aged birth to three years. The movement of the eardrum should be examined with a pneumatic otoscope. Tympanometry can also be helpful, particularly when the diagnosis is in doubt. Antibiotics are less successful in draining fluid from the middle ear in OME, despite their effectiveness in decreasing infections in AOM. When antibiotics are given, there is just a minor increase (14%) in OME resolution. A hearing evaluation is advised if bilateral OME lasts longer than three months. Myringotomy with ventilation tube insertion is advised for a child who has had bilateral middle ear effusion with hearing loss for 4–6 months. Tubes allow the middle ear to ventilate and the mucosal linings to stabilize, resulting in better hearing and a lower frequency of symptomatic acute otitis media episodes while the tubes are in place. (Roberts, J. and Hunter, L., 2002).

IV. Developmental Concerns

OM is most common during the first three years of life, when early language development is most critical. Earaches (76%), sleep disturbance (64%), behavioral difficulties (49%), speech and hearing concerns (33–62%), and balance symptoms (15%) are among the symptoms reported by parents of children with OME. (Colella, K.M., 2019). One of the most important reasons for medicinal and surgical treatment, such as antibiotics and tympanostomy tubes is to avoid any developmental repercussions associated with OM. (Roberts, J. and Hunter, L., 2002).

OME is thought to alter children's capacity to process language at a rapid rate, affecting both comprehension and production in phonology, vocabulary, syntax, and discourse. It causes a mild-to-moderate hearing loss that lasts as long as the fluid persists. Because of the disruption and fluctuation in auditory input caused by OME, children may encode information incompletely and incorrectly into their phonological working memory, resulting in inappropriate word representations. Certain low-substance grammatical morphemes, like as inflections of short duration and low intensity (e.g., third person /s/, past tense /"ed"/), may be skipped or misheard by children with OME. (Roberts, J. and Hunter, L., 2002).

Ultimately, it is believed that children who experience extended or frequent OME become inattentive, especially in noisy circumstances, resulting in attention deficit disorder for auditory-based information. Academic performance, especially in reading and other language-based topics, may be harmed as a result. Recent models of the potential link between a history of OME and children's language development propose that not only the child's surroundings, but also the child's interaction with the environment, can influence this link. These include both risk factors (e.g., a child with poor phonemic awareness skills, a mother with less than a high school degree, and a loud childcare setting) and protective factors (for e.g., a child with extensive vocabulary, a literacy-rich home environment, and a responsive child care setting). (Roberts, J. and Hunter, L., 2002).

V. Linking OM to Hearing

In nearly half of the cases, OME causes hearing loss. The hearing loss is usually conductive, which means that sound does not travel from the middle ear to the cochlea, the inner ear. The average hearing loss is 20–25 decibels, although it can range from none to 50 decibels, and the audiometric configuration (the shape of the hearing loss) can also vary greatly. Hearing will generally return to normal once OME is resolved. Repeated bouts of OM, however, have been demonstrated to create a sensory hearing loss in the high frequencies (4000 Hz and above). Although the functional impact of such high-frequency hearing loss is controversial, it has been demonstrated to be significant for the perception of high-frequency speech sounds like "s.". (Roberts, J. and Hunter, L., 2002). Hearing aids may become useless briefly as a result of OM in children with pre-existing sensory hearing loss. OME has been found to have effects on activities that begin in the lower brainstem and need equal (binaural) hearing by both ears, in studies of its impact on central auditory processing. For the normal child with OME, these effects fade over time and are completely gone by puberty. (Roberts, J. and Hunter, L., 2002).

Early OME history has been linked to difficult auditory tasks, in several studies involving central auditory function (higher order tasks) such as interpreting speech in fluctuating background noises. Lisa Hunter and colleagues found that hearing loss due to OME beyond the age of three years was associated with poorer high-frequency hearing in children with chronic OME in prospective trials at the University of Minnesota. Because the translation of laboratory measures into academic achievement has not been demonstrated, studies exploring the impact of OME on auditory processing should be viewed with caution. (Roberts, J. and Hunter, L., 2002).

VI. Linking OM to Speech, Language, and Learning

Despite a large number of research completed over the last three decades on whether children who experience regular OME in early childhood score worse on measures of speech, language, and academic success than children who do not have such a background, the literature is still conflicted. (Roberts, J. and Hunter, L., 2002). Within the literature, there are, nonetheless, certain areas of agreement. A history of OM in early childhood has been linked to later receptive and expressive language, syntax, vocabulary, and narratives during the preschool and early elementary school years, according to several prospective studies. Other research, on the other hand, have shown no link between a history of OME and later assessments of receptive or expressive language, vocabulary, syntax, or storytelling. (Roberts, J. and Hunter, L., 2002).

Several ongoing prospective investigations are yielding valuable new insights. Joanne Roberts and colleagues at the University of North Carolina are investigating the links between OME and hearing loss in early childhood and later auditory processing, language, and academic skills in a group of children whose OME, hearing loss, and caregiving environments have been tracked prospectively since infancy. The responsiveness of the child's home and childcare surroundings was discovered to have a crucial role in the association between OME and associated hearing loss and children's language development during infancy. They also discovered a slight link between a history of OME and later expressive language development, but that children caught up by second grade and that a child's age was not a factor. (Roberts, J. and Hunter, L., 2002).

NICHD-funded research is being carried out by Jack Paradise and colleagues at the University of Pittsburgh. The purpose of these trials is to see if timely insertion of tympanostomy tubes, which drain fluid and equalize middle-ear pressure, improves children's language development as compared to delayed insertion. According to Paradise and colleagues, quick insertion had no effect on children's language development. (Roberts, J. and Hunter, L., 2002).

In conclusion, there is growing evidence that OME is not a significant risk factor for later speech and language development in generally developing children. Although a few studies have found a minor link between OME and later speech, language, or academic achievement, the effect size is often tiny, accounting for zero to around 4% of the variance in children's development. However, the findings should be interpreted with caution because almost all of these studies used OME as the independent variable rather than hearing loss (the degree of hearing loss is thought to affect development), and many did not account for important influencing factors such as socioeconomic status. (Roberts, J. and Hunter, L., 2002).

VII. Implications for Practice

These authors propose a treatment approach that offers special care to children at high risk for developmental issues when hearing loss is coupled with persistent OME, based on their findings. Children who are already at risk for language and learning issues, such as children from underserved groups and children who have had a chronic hearing loss of more than 20 DB HL due to OME, are among them. SLPs and audiologists should examine numerous clinical implications of a history of OME in these children. (Roberts, J. and Hunter, L., 2002). When it comes to offering clinical services to late talkers, choosing the right interventionist is a crucial first step. (DeVeney, S.L., Hagaman, J.L. and Bjornsen, A.L., 2017)

When treating late talkers, 2- to 3-year-old toddlers with primary language deficits, the authors examine cultural influences on clinical encounters. They look at the literature to see if essential components of early language treatment are culturally relevant, and if they aren't, they offer alternate professional measures. Triadic or multiparty treatments, including siblings or others, more structured tasks or group settings for language training, and the creation of culturally appropriate directive language strategies are some of the alternatives. In order to motivate therapy, there is also a need to emphasize social language use and professional clarity on links between early infant language competence and later achievements. (Wing, C., Kohnert, K., Pham, G., Cordero, K.N., Ebert, K.D., Kan, P.F. and Blaiser, K., 2007).

An expressive phonology assessment and an evoked non-word imitation test were conducted on 26 late talkers and 26 age-matched typically developing toddlers. The breadth of child responses in a subset of monosyllabic stimuli from the toddler phonology evaluation and the non-word imitation test were quantified. There were correlational and cluster analysis performed. No answer, proto-word response, distinct verbal response, proper phoneme, common and uncommon phonological faults were the six response types. (Hodges, R., Baker, E., Munro, N. and McGregor, K.K., 2017). The use of most response categories by toddlers was associated across the two sampling contexts. The use of response types was also linked to a number of direct and parent-reported measures. In both sample scenarios, there were significant group variations in the use of many response categories. Five late talker subgroups were discovered, each with distinct response characteristics. (Hodges, R., Baker, E., Munro, N. and McGregor, K.K., 2017)

After three months of bilateral OME, four to six episodes of OM in a six-month period, and/or when families or caregiver's express concerns about a child's development, a child's hearing, speech, and language should be examined. Children under the age of three who are at higher risk for OME (e.g., children with Down syndrome, children with cleft palate) should be evaluated for OME and hearing loss at least twice a year, particularly during the winter months. Hearing and middle-ear status assessment should be done routinely as part of an ongoing intervention program for children participating in speech-language therapy who have chronic OME. Families and other caregivers of young children with recurrent or persistent OME (e.g., childcare providers) require current, clear, and accurate information in order to make medical and educational decisions for their children. (Roberts, J. and Hunter, L., 2002).

A highly responsive language and literacy-enriched environment will aid children who have recurrent or persistent OME. Children with chronic OME will benefit from a good listening environment in which the voice signal is clear and background noise is minimal. Some children with a history of OME may struggle with language and other developmental issues, and early intervention can be beneficial. If a child has a speech delay or impairment, he or she should receive speech and language therapy. (Roberts, J. and Hunter, L., 2002). For some children with intermittent and persistent hearing loss associated with OME, the use of personal or sound-field FM devices has been proven to be effective. The speaker, such as a teacher, wears a small microphone and FM transmitter, and the sound is relayed to either the child's earphones or a classroom loudspeaker. When necessary, SLPs and audiologists can collaborate with families to refer children to other health care providers. Clinicians can also provide information on a child's speech, language, hearing, and behavior to families and health care professionals, which can help them make decisions like whether or not to put tubes in his or her ears. (Roberts, J. and Hunter, L., 2002).

Due to a history of OME and related hearing loss, some children who are already at risk for language and learning challenges, such as children from special populations, may be at an increased risk for subsequent language and learning difficulties. In the management of young children with histories of OME, each child's hearing status, language abilities, and development must be examined until more study can determine whether there is a link between a history of OME and later developmental skills. (Roberts, J. and Hunter, L., 2002).

VIII. Conclusion

The history of the middle ear in late talkers has a large impact on language development, we believe it is vital to figure out what causes late talkers. As children begin to talk and interpret words during the first three years of life, which is when they have the most otitis media difficulties. Interacting with people around them teaches children how to do this. We are convinced that it may be more difficult to hear and understand speech if fluid in the middle ear muffles sound. Early-onset otitis media (under 12 months) puts children at a higher risk of having long-term speech and language impairments. Otitis media interacts badly with pre-existing cognitive or language difficulties, according to our research. Fluid in the middle ear is not desirable, especially if it occurs frequently; it can make it difficult for children to hear, resulting in speech and language difficulties.

It might be tough to detect if the child has an ear infection, and symptoms can manifest in a variety of ways, so it's critical that parents must not ignore it.

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