OTITIS MEDIA IN CHILDREN-RISK FACTORS AND COMPLICATIONS

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Abstract

Introduction: Acute otitis media (AOM) is the most frequent diagnosis of the sick children visiting clinicians' offices and the most common reason for administration of antibiotics.

Method: The study included 104 patients discharged from Pediatric Clinic III - "Saint Mary's" Children's Clinical Emergency Hospital of Iasi from January 2015 to January 2017, diagnosed with "Acute otitis media".

Objective: On this batch we performed a retrospective study based on the data found in the children's medical charts, by observing the risk factors to which they were exposed and that favor the illness, and also the connection between the risk factors and the occurrence of complications.

Results: The risk factors for acute otitis media that we identified in this group were the cold season, male gender, premature birth, low birth weight, artificial alimentation in the first year of life, incorrect dietary diversification, child's becoming a community member, higher number of siblings, association of respiratory tract infections, of chronic diseases or immune deficiencies, allergic status, exposure to pollutants. To prevent premature and late complications, it is important to accurately specify the diagnosis and establish individualized therapy according to guidelines. It is also essential to follow up and ensure directly observed therapy for children through the collaboration of a pediatrician with the family doctor and the ENT specialist.

Keywords: acute otitis media, prevalence, risk factors, children

Introduction

Upper respiratory tract infections represent the most frequent cause for doctor consults, but also for mortality in patients under 5 years old, regardless of whether they come from developed or developing countries. A significant proportion of upper respiratory tract infections (approximately 30%) is represented by acute otitis media, often a complication of other respiratory pathologies. It is estimated that 20,000 people die annually due to complications of otitis media and the majority are children under 5 years old (1).

RISK FACTORS

Over the years, several hypotheses have been launched to justify the increased prevalence of acute otitis media in pediatric patients compared to adults.

It was found that the age between 6 months and 3 years, followed by the age of 4-5 years - associated with the moment of becoming a community member is the main risk factor in the occurrence of this infection, besides the anatomical features of the child (shorter and horizontalized Eustachian tube) (5,7). Also, about one third of children with otitis media have a genetic dysfunction of the Eustachian tube or other syndromes with anatomic anomalies (palatoschisis) or changes in the airways' function that could favor neighboring infections (Kartagener's syndrome) (5). Acute adenoiditis characteristic of children leads to decreased nasal pH, with persistence of bacterial outbreak. These factors result in varying degrees of tubal obstruction, with pressure drop in the middle ear, resorption of air and fluid accumulation in the middle ear, initially of the transudate type, characteristic to serous otitis media, often asymptomatic. The superinfection of this fluid leads to suppurative otitis media (8,11).

There are also other endogenous risk factors such as male gender, race (Amerindians, Eskimos), immune deficiencies, atopic tendency, low birth weight, premature birth, protein-calorie malnutrition, recurrent upper airway infections, nasotracheal intubation (5,6).

Natural alimentation plays an important protective role. It has been demonstrated that the incidence of otitis media decreases by 13% during the first 3 months, probably through the transfer of immunoglobulins, cellular elements and non-specific components of breast milk with antibacterial, antiviral and antiparasitic properties.

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The α-lactalbumin from the breast milk has a bactericidal effect on pneumococcus, while oligosaccharides bind to pneumococcal adhesins, preventing the adhesion of bacteria to the epithelium (5,12).

One of the most important exogenous risk factors is the attendance of a community, such as nurseries, from a small age.

The living environment, precarious hygiene, families with numerous siblings who may have a history of otic infections double the risk of developing otitis media (4,13).

Passive smoking, especially in the first year of life is incriminated for approximately 2 million episodes of otitis media and over 150,000 tympanostomies. The pathophysiological mechanism is probably hypersecretion of mucus in the respiratory tract and damage of the mucociliary transport (3,10).

The use of the pacifier increases the risk of otitis media in children over 1 year by 24% as continuous suction causes dysfunction of the Eustachian tube and leads to the inoculation of the middle ear with pathogenic bacteria (7,9).

According to the etiology of acute otitis media, its main cause is bacteria (70-90% of cases), in the following order: Streptococcus pneumoniae - 27-52%, Haemophilus influenzae - 16-52%, Moraxella catarrhalis 2-15 % producing beta-lacatamases. Much less rarely were isolated Staphylococcus aureus, Streptococcus pyogenes, Pseudomonas aeruginosa, Klebsiella pneumoniae, Escherichia coli, Alloicoccus otitidis, mycobacteria. Infections with these germs were found more frequently in immunosuppressed patients (2,7,12,14).

Material and method

The study included 104 patients discharged from Pediatric Clinic III - "Saint Mary's" Children's Clinical Emergency Hospital of Iasi from January 2015 to January 2017, diagnosed with "Acute otitis media". These patients were selected from the total number of patients admitted to this clinic during those two years.

On this batch we performed a retrospective study based on the data found in the children's medical charts, by observing the risk factors to which they were exposed and that favor the illness, and also the connection between the risk factors and the occurrence of complications.

The diagnosis of acute otitis media was established in accordance to the guidelines. Thus, according to the American Academy of Pediatrics, the diagnosis of acute otitis media is required when the onset is sudden, with pain, fever, inflammatory otitis signs, accompanied by exudate found in the middle ear during an otoscopic examination. In the case of babies, marked agitation, the tendency to lean their heads on the affected side, refusal to eat, lack of sleep, crying or screaming apparently without reason are signs that draw attention to the otic affection.

Results

41.8% of the 104 children included in the study came from rural areas and 58.2% from urban areas, having varying socio-economic conditions (good and very good, and only sporadically children coming from extremely poor environments and exclusively supported by the State) (Figure 1).

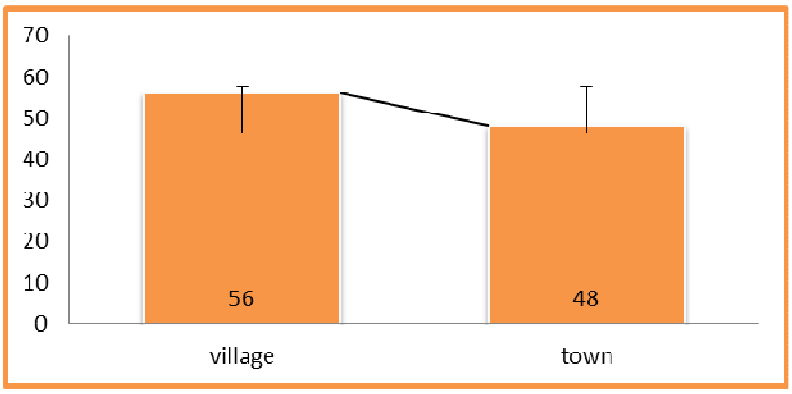

Fig. 1. Distribution according to the home environment.

The distribution by gender observes the pattern of incidence of the studied pathology, with predominance of the male gender (66 boys and 38 girls).

Also, patient ages correspond to the peak incidence of otitis media in the pediatric population, noting that:

- over 80% of cases occur under 6 years, of which over 50% are under the age of 2 years
- two maximum frequencies have been reported: at the age of 1 (25% of cases) and at the age of 4-5, when children usually become members of specific communities (Fig. 2)

Regarding the attendance of communities, more than half of the patients who came to the doctor were under the age of 2. The high number of illnesses can be influenced by the attendance of a community by older siblings; 68% of cases attend communities and 32% do not.

Out of the 104 children included in the study, 87.5% were born on term (37-42 weeks) and 12.5% were born premature (between 32-36 weeks). In the case of girls, the incidence of prematurity was 14%, higher than the incidence in boys (10.7%).

Of all the births, 67.3% were natural births and 22.7% caesarean sections. 14.42% were laborious births, complicated mainly by nuchal cord, haemorrhages that required transfusions and fetus-pelvis disproportions with perineal ruptures.

Given that exposure of the child to aeroallergens or pollutants, especially passive smoking, is an important risk factor in the occurrence and recurrence of acute otitis media and respiratory tract infections, we considered relevant to assess its presence:

-60.5% were not exposed to pollutants;

-23% were exposed to cigarette smoke;

-16.5% were exposed to other pollutants, such as toxic gases (Fig. 2).

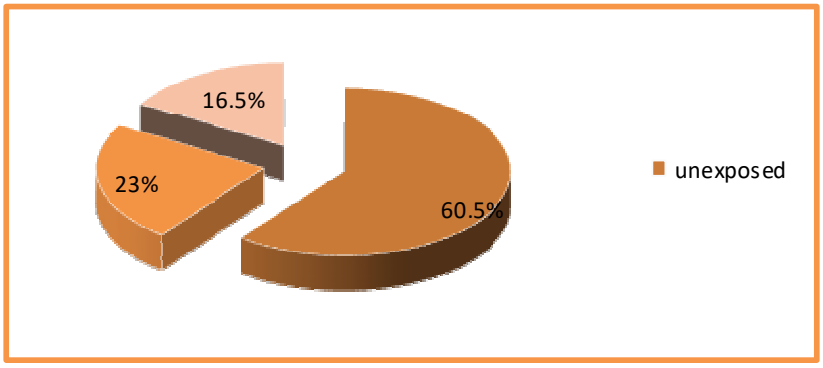

Fig. 2 Exposure of the patients in the studied group to pollutants.

Only 48.2% of the children were breastfed after birth, and the remaining 52.8% were artificially fed cow milk either immediately after birth or after 2-3 months of breastfeeding.

As far as the environment of origin is concerned, urban children were more frequently breastfed (48.21% compared to 42.71% from rural areas), which can be explained by the higher level of education and degree of information on the importance of breastfeeding.

At the time of admission, some deficiency-related conditions were identified: 35 of the children (32%) – deficiency anemia, 17 cases (15%) - protein-calorie malnutrition, 8 cases (7%) – deficiency rickets and 7 cases %) associated multiple deficiencies.

Selected cases have frequently reported association of pathologies that have been shown to influence or even cause acute otitis media: repeated upper respiratory tract infections, recurrent wheezing, pneumonia, acute or chronic adenoiditis, chronic background diseases, atopic tendency or congenital immune deficiency (Fig. 3).

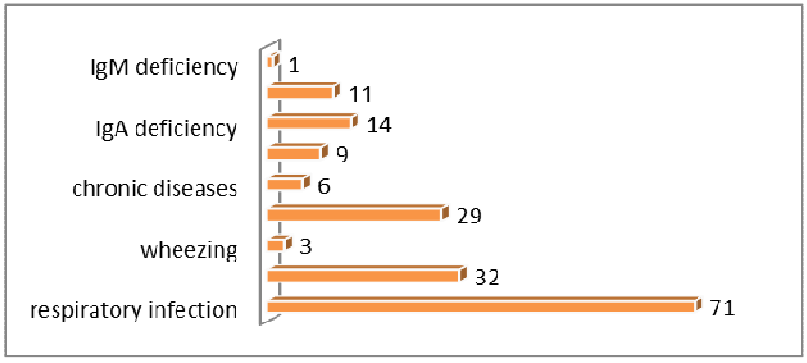

Fig.3 Related diseases present in the studied group.

The association with other upper respiratory tract infections was highlighted in 68.26% of the patients, which proves that they are a fundamental risk factor in the occurrence of acute otitis media. The association to a higher degree of adenoiditis with maximum frequency between 2 to 3 years of age (37.5% of the total cases), followed by the age group of 4-5 years (28.13%), and then of 0-2 years (21.88%) and children over 5 years (12.49%) was noted.

Also, a significant percentage (30.76%) was represented by the coexistence of chronic adenoiditis followed by pneumonia (27.88%), immune deficiency (25%), atopy (8.65%), chronic diseases (7%) and recurrent wheezing (2.88%). Among the atopic patients, one was allergic to latex, one to mold, and 7 to antibiotic allergens (ceftriaxone, amoxicillin and penicillin).

Among children with respiratory tract infections, 38% were simultaneously diagnosed with deficiency anemia, 21.13% with protein-calorie malnutrition, 14% with IgA and / or IgG immune deficiencies, and 64.79% were artificially fed.

Another risk factor that we have pursued in this study was the vaccine situation of the patients, regarding the observance of both the National Vaccination Scheme and the pneumococcal vaccination (optional vaccination). We found that 67.3% of the children were vaccinated according to the national scheme in force, with only 17.14% receiving the pneumococcal vaccine. The incidence of unvaccinated children in the study group according to age was the following: 26.92% in infants, 10.77% in patients between 1-2 years of age, 17.27% for patients between 2-3 years of age, 27.5% % in patients between 4-5 years of age and 17.54% in patients over 5 years.

The season in which the disease occurred is also part of the cumulative factor favoring otitis. 62% of children got sick in the hot season, and in 38% of the cases the sickening occurred in autumn and winter.

The number of episodes of otitis occurring in each patient is a parameter that allows the assessment of recurrent otitis. 63.4% of the children were at their first episode, 27.04% at their second, while 17.6% experienced more than 3 illnesses. The highest number of doctor consults with the diagnosis of acute otitis media was that of a 2-year old child (7 episodes).

The youngest patients admitted were 2 newborns of 18 days, and 27 days respectively, the latter with two episodes of otitis. At the other extreme was a 17-year-old patient in their first episode. In the category of children under 1 year, 69.2% were at their first illness, 19.2% in the second and 11.6% had at least 3 bouts. From the age group of 1-2 years, 47.3% were at their first episode, and 19.5% were at their second episode of otitis.

Symptomatology at the time of admission was represented by:

-Fever - 95 cases (91.3%)

-otalgia - 45 cases (43.27%)

-otorrhea -12 cases (12.5%)

-hypoacusis - 16 cases (15.38%)

-psychomotor agitation and nonspecific symptoms - 19 patients (18.27%) and 73% of infants respectively.

Thus, the established diagnosis is:

- acute suppurative otitis media - 38.46% of children
- acute serous otitis media - 36.54%
- acute congestive otitis media - 25%

In order to support the diagnosis of acute otitis media, laboratory tests were performed: haemoleucogram, inflammatory syndrome (ESR, fibrinogen, reactive C protein).

In 27.88% of the patients, the haemogram revealed the existence of anemia.

36.54% had leukocytosis at the time of admission. In 49% of the cases included in the study, neutrophilia was detected, in 60.57% lymphocytosis and in 61.54% monocytosis.

Elevated ESR rates were reported in 66.35% of patients, increased fibrinogen rates in 39.42%, and C-reactive protein had elevated rates in 31.73% of cases.

In 13 (32.5%) of the 40 patients with acute suppurative otitis media, otic secretion cultures were performed with antibiogram. In two of them Staphylococcus aureus was isolated, sensitive to oxacillin, as well as a coagulase-negative Staphylococcus strain, four cultures were positive for pneumococcus sensitive to Levofloxacin and Clindamycin, in two media diphtheria bacilli developed, in one medium Enterobacter cloacae developed, on one medium Escherichia coli developed, and the exudate of one patient was polymicrobial, with the isolation of Staphylococcus aureus and Escherichia coli (Fig. 4).

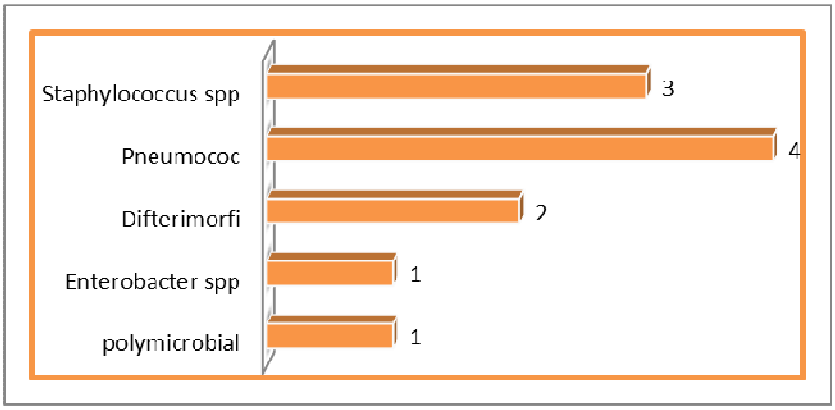

Fig. 4 Results of cultures from otic secretion in suppurative otitis.

Out of the 104 cases constituting the studied group, 32% developed complications:

- hypoacusis: 11 cases (11.53%)
- mastoiditis: 9 cases (9.63%)
- ethmoiditis: 2 cases (1.92%)
- cerebral venous thrombosis: 2 cases (1.92%)
- cerebral abscess: 2 cases (1.92%)
-septicemia: 3 cases (3.85%).

The treatment of acute otitis media included symptomatic therapy with the use of antipyretics, nonsteroidal anti-inflammatory drugs, mucolytics, and etiologic therapy (antibiotic therapy).

In complicated cases, surgical interventions were performed to excise abscesses, as well as mastoid debridement, and transtympanic aerators were inserted.

In terms of etiological treatment, the main therapeutic classes used as a first choice were third-generation cephalosporins in 60 children, natural penicillins in 22 children, second-generation cephalosporins in 6 children, aminopenicillins in 6 patients, fluoroquinolones in 5 patients, followed by lincosamide, aminoglycosides, macrolides, sulfonamides, with lower use.

Discussions

Concerning the 104 patients included in the study group, their socio-economic conditions were predominantly good and very good, sporadically precarious, and gender distribution complied with the incidence pattern of the studied pathology (male gender: female = 1.74: 1).

The percentage of infants included in the batch was 25%, as was the case of children aged 1-2 years, consistent with the data in the literature, which claim that the peak of incidence is around 1 year of age (with a limit between 6 and 18 months). This is explained by the anatomy of age, when the Eustachian tube is shorter and horizontalized, but also by increased susceptibility to infections due to the immaturity of the immune system.

In terms of nutrition, only 47 of the children were breastfed after birth, the remaining 57 being artificially fed. It is known that the initiation and support of lactation is related to genetic, constitutional and anatomical factors, as well as to socio-economic factors, such as stress, professional insertion and mother's nutrition.

Paradoxically, we noticed that the proportion of unvaccinated individuals is higher among those from urban areas and whose parents attended higher education. This can probably be explained by easier access to information sources that promote the refusal to vaccinate for reasons lacking a medical base.

Among the exogenous risk factors, we found a higher exposure to pollutants, mainly passive smoking in infants, in a proportion of 32% of the total number of exposed patients.

At the age of 2-3 years, there is an increased incidence of acute adenoiditis, favoring tubal dysfunction and recurrence of otitis. The age group of 4-5 years associates a large number of artificially fed and unvaccinated children with adenoiditis in the first year of life. A large proportion of them were born by caesarean section, with an Apgar score of less than 8 and had a low birth weight.

Among children over 5 years old, we have identified the highest proportion of unvaccinated patients with allergies and incorrectly diversified diet. They were also exposed to pollutants and came from families with several children.

A risk factor regardless of age quoted in the specialized literature is the cold season, which is also confirmed in the studied group.

Conclusions

Acute otitis media is an important part of the pathology of pediatric patients, leading to increased addressability to the doctor, especially during the cold season.

The incidence peak of acute otitis media in infants, equal to that of children aged 1 to 2 years, is due to the cumulative number of risk factors in this age group, namely: the more frequent association of other upper respiratory tract infections, pneumonia, anemia, protein-calorie malnutrition, rickets and incorrect dietary diversification. In addition, increased exposure to pollutants, especially cigarette smoke, is added in case of infants.

The rate of complicated otitis was 19.23%, and 6.73% of the children developed simultaneous multiple complications, including: hearing hypoacusis, acute ethmoiditis, acute otomastoiditis, cerebral thrombophlebitis, cerebral abscesses, septicemia.

Nonspecific symptomatology was common in infants (19 patients under 1 year, and 73% of infants manifested psychomotor agitation and nonspecific symptoms) and the routine otoscopic examination of all children with respiratory infections is an essential condition for the diagnosis of otitis media.

The risk factors for acute otitis media that we identified in this group were the cold season, male gender, premature birth, low birth weight, artificial alimentation in the first year of life, incorrect dietary diversification, becoming a the community member, higher number of siblings, association of respiratory tract infections, of chronic diseases or immune deficiencies, allergic status, exposure to pollutants.

To prevent premature and late complications, it is important to accurately specify the diagnosis and establish individualized therapy according to guidelines. It is also essential to follow up and ensure directly observed therapy for children through the collaboration of a pediatrician with the family doctor and the ENT specialist.

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