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ANTIBACTERIAL TREATMENT OF ACUTE BACTERIAL DISEASES OF THE UPPER RESPIRATORY TRACT IN CHILDREN

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Abstract: For acute respiratory viral infections (ARVI) in children, antibacterial therapy is required in only 6-8% of cases accompanied by bacterial complications. This article discusses only lesions of the upper respiratory tract and some types of bronchitis (caused by mycoplasma and chlamydia), for which the prescription of antibacterial agents is indicated. Unfortunately, the frequency of prescription of antimicrobial drugs in children with acute respiratory viral infections significantly exceeds this figure, reaching 65-85% in clinics and 98% in hospitals, and antibacterial agents are administered parenterally in clinics in more than 40%, and in hospitals - in 70% cases [1,2]. With this approach, there are 39 injections per inpatient with uncomplicated ARVI (laryngitis, bronchitis), and 74 per patient with acute pneumonia.

Keywords: antibacterial therapy, upper respiratory tract, children.

It is obvious that with a viral etiology of the disease, antibiotics are at least useless, and, most likely, harmful due to the disruption of the biocenosis of the respiratory tract and their colonization by flora unusual for this biotope, often intestinal [3]. In addition, the significant risk of allergic reactions to antibiotics should always be kept in mind. Of course, this situation needs to change, most likely based on the development of rational recommendations for antibacterial treatment of children with acute respiratory diseases and their strict implementation in practice.

Criteria for diagnosing a bacterial complication of ARVI

If there is an obvious focus of bacterial inflammation in a child with ARVI, the diagnosis is simple; the following can be used as diagnostic criteria.

Angina. Hyperemia and swelling of the pharynx and tonsils, purulent plugs or plaque.

Most tonsillitis in young children is caused by viruses (adeno-, enteroviruses), but with age, the proportion of tonsillitis caused by group A hemolytic streptococcus, which is fraught with immunopathological changes, in particular rheumatism, increases.

A reliable criterion for diagnosing bacterial tonsillitis is the isolation of (group A b-hemolytic streptococcus from the throat; According to clinical data, pharyngitis of this etiology is reliably diagnosed with scarlet fever or a similar picture of the pharynx; in other cases, the diagnosis is presumptive and requires bacteriological confirmation. The main goal of antibacterial therapy is the elimination of streptococcus for

the prevention of rheumatism; this treatment does not always have an effect on the clinical manifestations of pharyngitis (possibly due to a combined infection with viruses).

Otitis media. Ear pain, high temperature, often symptoms of intoxication, discharge from the ear. The diagnosis is made based on clinical data and confirmed by otoscopy. In the etiology of otitis, pneumococcus is in first place; less often, otitis is caused by capsular Haemophylus influenzae or Moraxella catharralis. Staphylococcus and Pseudomonas aeruginosa usually cause otitis in children with a defective immune system (prematurity, severe illness).

Sinusitis is non-purulent. X-ray and echographic signs of sinusitis (darkening of the paranasal sinuses) are detected in 70% of children with a respiratory viral infection; these conditions do not require antibacterial treatment [4]. The diagnosis of non-purulent bacterial sinusitis is made when these changes persist for more than 3 weeks and the presence of clinical manifestations in the form of long-lasting runny nose, nasal congestion, and mild pain in the sinuses.

The main pathogens are S. pneumoniae, Haemophylus influenzae, and less commonly Staph. aureus (purulent sinusitis!) or Moraxella catharralis.

Purulent sinusitis. Typically, acute staphylococcal inflammation of the sinuses is characterized by high fever, intoxication, swelling of the cheek and periorbital tissues.

Lymphadenitis. Enlargement and pain of the lymph node (usually tonsillar), often with swelling of the surrounding tissue, with suppuration - with fluctuation.

Etiology - streptococcal, rarely - staphylococcal.

Acute bronchitis. Cough, dry and variable moist rales, in the absence of infiltrative or focal changes in the lung tissue on the radiograph. The majority of acute bronchitis (85-95%) has a viral etiology, so the use of antibacterial agents is not required. It is also not justified to prescribe these drugs in the later stages of bronchitis when there is increased sputum discharge (often greenish).

In 5-15% of cases in children of preschool and school age, especially in the autumn, bronchitis caused by Mycoplasma pneumoniae is observed; they are characterized by an abundance of fine wheezing and their asymmetry, as well as the presence of conjunctivitis (without profuse effusion).

Bronchitis in children aged 0 - 5 months can be caused by Chlamidia trachomatis, in adolescents - C. pneumoniae; their frequency is not precisely known, but there is reason to believe that it is small.

Bacterial bronchitis is observed in infants with habitual food aspiration syndrome, usually accompanying aspiration pneumonia. Bacterial descending tracheobronchitis is observed as a complication of croup (during intubation).

These data show that antibacterial treatment of acute bronchitis is indicated in a small percentage of cases; to calculate the requirement, it can be assumed that it is necessary in 15% of cases.

Pneumonia. The presence of respiratory disorders of varying severity and characteristic physical changes (shortening of percussion sound, bronchial or weakened breathing, fine moist rales over a limited area of the chest). Radiological confirmation is based on the identification of focal or infiltrative changes on the radiograph. This article does not discuss the problem of treating pneumonia.

Suspicion of a bacterial infection. In addition to diseases with an obvious bacterial focus according to clinical or paraclinical data, in practice there are often cases in which, despite the absence of an obvious focus (with the available “depth” of the examination), it is not possible to exclude a bacterial infection.

The category of ARVI patients with reasonable suspicion of a bacterial infection, including pneumonia (in the absence of obvious symptoms upon examination), includes children with one or more of the following signs:

- temperature above 38°C for more than 3 days;
- shortness of breath: if there are 60 breaths or more per minute in children 0 - 2 months, 50 or more - in children 3-12 months and 40 or more - in children 1 - 3 years old in the absence of bronchial obstruction;
- retraction of the yielding areas of the chest or grunting breathing in the absence of bronchial obstruction;
- severe toxicosis;
- leukocytosis - more than 12,000 in 1 μl, shift of the formula to the left, ESR more than 20 mm/h.

Sensitivity of pneumotropic flora. In many countries of the world over the last decade, there has been an increase in the resistance of pneumococci circulating among the population to penicillin, reaching 40 - 50% of all isolated strains in southwestern European countries [5]: our observations showed the absence of such a trend in Moscow. All penicillins, macrolides lincomycin, and cephalosporins are highly active against this pathogen; Aminoglycosides, as well as tetracycline, are practically inactive.

Based on our own 15-year observations, we can say that the sensitivity of Haemophylus influenzae (both capsular and non-capsular) to ampicillin and azithromycin, doxycycline and tetracycline, aminoglycosides, cephalosporins of the 2nd and 3rd generations, rifampicin also remains at a fairly high level . With regard to this pathogen, however, we observe a decrease in sensitivity to penicillin and 1st generation cephalosporins (cephalexin, cefazolin), erythromycin; many strains of this pathogen turned out to be insensitive to 2nd generation macrolides and resistant to lincomycin, oxacillin, and oleandomycin.

Group A hemolytic streptococcus remains highly sensitive to all antibiotics except aminoglycosides. However, the use of many drugs often gives unsatisfactory results, which is associated with the inactivation of penicillins and other lactam drugs by lactamase secreted by the flora accompanying streptococci (hemophilus, moraxella, staphylococci) [6]. Streptococci of other groups are sensitive to oxacillin, cephalosporins of the 2nd and 3rd generations, lincomycin and rifampicin, and somewhat less sensitive to other penicillins and macrolides.

Moraxella (Branchamella) catharhalis, even if it does not cause an inflammatory process, is capable of producing lactamase and worsening the results of treatment, for example, of streptococcal pharyngitis with penicillins.
Strains of this pathogen are highly sensitive to macrolides, 2nd - 3rd generation cephalosporins, aminoglycosides and rifampicin, but resistant to penicillins and lincomycin.

Non-hospital strains of Staphylococcus aureus were characterized by a fairly high percentage of resistance to cephalexin (43%), cefaclor (30%), ceftibuten (92%), oxacillin (28%) and a small percentage (12-15%) to erythromycin and oleandomycin. In children with repeated sinusitis and otitis and in those previously treated with antibiotics, resistance of the flora (especially Haemophilus influenzae and Moraxella) to antibiotics can be expected, which must be taken into account when choosing initial therapy.

Antibacterial treatment of respiratory diseases

Acute pharyngotonsillitis. In the treatment of streptococcal pharyngotonsillitis, the main goal is the persistent elimination of group A streptococcus, which creates a risk of developing rheumatism. Bacteriological control is desirable not only after 10 days of treatment, but also after 4–6 weeks, when bacteriological relapses are often observed.

In order to eliminate the pathogen, most antibiotics are used to which this pathogen is sensitive (except for aminoglycosides). Contrary to previous recommendations about the need for parenteral administration of penicillin in such patients, the sanitizing effect of oral drugs has been proven, in particular, penicillin 50 mg/kg/day, amoxicillin 40 mg/kg/day or macrolides: oleandomycin 250 - 1000 mg/day or erythromycin - 30 mg/kg/day (but not more than 1.5 g/day). The duration of treatment is at least 10 days.

Antibiotics for bacterial upper respiratory tract infections

Form	Pathogen	Starting drug	Replacement if ineffective
Otitis medium acute	S. pneumoniae, N. influenzae, less commonly S. aureus	Oral phenoxymethylpenicillin (PMP), amoxicillin: erythromycin, other macrolides	Orally co-amoxiclav, 2nd - 3rd generation cephalosporin orally, intramuscularly
Acute non-purulent sinusitis	S. pneumoniae, N. influenzae	Oral FMP, amoxicillin: erythromycin, other macrolides	Orally amoxicillin/clavunalate (AMC/CL), 2nd - 3rd generation cephalosporin orally, intramuscularly
Purulent sinusitis	S. aureus	Intravenous oxacillin or cefazolin + gentamicin	Lincomycin or vancomycin intramuscularly or intravenously
Otitis, recurrent sinusitis, treated with antibiotics	Resistant S. aureus, less commonly Moraxella catarrhalis H. Influenzae	Orally co-amoxiclav, orally or intramuscularly 2nd - 3rd generation cephalosporin	Intramuscular oxacillin, intramuscular cephalosporin 1 - 3rd generations + gentamicin
Acute tonsillitis	Str. pyogenes (b-hemolytic, group A	Oral FMP, macrolides, cephalexin 10 days, cefuroxime-axetil, ceftibuten 5 days	
Bronchitis	Viruses	Antibacterial treatment is not carried out	
Bronchitis	M. pneumoniae	Erythromycin, other macrolides	
Bronchitis	Chlamydia spp.	Erythromycin, other macrolides	Co-trimoxazole

Since the 10-day course of treatment with rapid improvement of the patient's condition is not followed by all parents, the frequency of bacteriological relapses is quite high. The search for shorter courses has shown that, for example, a 3- or 5-day course of azithromycin gives a higher relapse rate than a 10-day course of phenoxymethylpenicillin [7]. Data have been published on a successful 5-day course of treatment with ceftibuten 9 mg/kg/day (not more than 400 mg/day) or cefuroxime-axetil 20 mg/kg/day [8]. Since it is impossible to distinguish clinically between sore throats with and without streptococcal culture, it is important to know the groups of patients in whom the presence of streptococcus is more likely. According to WHO data [9], which coincides with ours, streptococcus is more often isolated in children with sore throat over the age of 5 years; More often the seedings turn out to be positive in the spring. These parameters can be used as a guide when deciding on antibacterial treatment for tonsillopharyngitis if bacteriological examination is not possible.

Otitis media. Detection of otitis media during ARVI serves as the basis for prescribing antibacterial therapy with oral medications. Active against both pneumococcus and Haemophilus influenzae: oral amoxicillin 20 - 50 mg/kg/day, ampicillin 50 - 80 mg/kg/day, erythromycin base 30 - 50 mg/kg/day (no more than 2 g/day)

The following are active mainly against pneumococcus: orally penicillin 50 mg/kg, oleandomycin 250 - 1000 mg/day, josamycin 30 - 50 mg/kg/day (not more than 1000 mg/day), roxithromycin 50 - 100 mg/day, midecamycin 30 - 50 mg/kg/day (no more than 1200 mg/day).

Most authors indicate the need to treat otitis media for at least 10 days.

We have seen the high effectiveness of oral antibacterial therapy (penicillin, ampicillin, amoxicillin, cotrimoxazole, macrolides). If these drugs are ineffective, as in children who received antibiotics before the disease, the use of second-choice drugs is justified - amoxicillin/clavunalate 50 mg/kg/day, cefuroxime-axetil 25 - 50 mg/kg/day, cefaclor 20 mg/kg/day , ceftibuten 9 mg/kg/day or azithromycin 5 mg/kg/day (3-5 days). In severe cases, a combination of gentamicin (6 mg/kg/day) with ampicillin (100 mg/kg/day) or cephamizine (100 mg/kg/day), as well as 3rd generation cephalosporins, is administered parenterally. For recurrent otitis, you should be guided by the results of culture of discharge from the ear and discuss the need for surgical treatment with an ENT doctor (adenotomy, shunting).

Non-purulent sinusitis. Treatment is carried out using the same tactics as for otitis media; It should be remembered that antibiotics do not affect the clinical picture and the rate of reverse development of changes in the sinuses in the acute period of ARVI, since they reflect purely viral inflammation of the mucous membrane. The question of treatment for sinusitis should be raised only at the 3rd - 4th week of acute respiratory infection, while maintaining clinical and radiological data.

Purulent sinusitis. The disease requires intensive care and often surgery. It shows parenteral administration of oxacillin 150 mg/kg/day or cefamizine 100 mg/kg/day, preferably in combination with gentamicin 6 mg/kg/day, which also suppresses the growth of staphylococcus.

Bronchitis is acute. Since in most cases the etiology of bronchitis (including obstructive bronchitis in young children) is viral, antibacterial treatment is not indicated. During viral bronchitis, as with any acute respiratory viral infection, non-invasive multiplication of pneumococcus and Haemophilus influenzae (but not staphylococcus) occurs in the sputum, however, as controlled trials have shown, antibacterial treatment does not affect the course of the disease. Antibacterial treatment is indicated for 2 forms of bronchitis. In preschoolers and schoolchildren during the period of epidemic rise of mycoplasma infection, bronchitis of this etiology can be treated with macrolides [10]. You can use erythromycin base 30 - 50 mg/kg/day (but not more than 2 g/day) or oleandomycin 250 - 1000 mg/day for 5 days. They can be replaced with other macrolides: roxithromycin 50 - 100 mg/day, midecamycin 30 - 50 mg/kg/day (no more than 1200 mg/day) or josamycin 30 - 50 mg/kg/day (no more than 1000 mg/day). For chlamydial bronchitis in children in the first six months of life (perinatal infection), macrolides are used in the indicated doses, as well as co-trimoxazole at 6 - 8 mg/kg/day according to trimethoprim; such treatment can speed up recovery [11]. For the treatment of chlamydial bronchitis in adolescents, the same drugs and doses are used as for mycoplasma bronchitis.

Conclusion

The progress of our knowledge about bacterial respiratory diseases and the expansion of the range of antibacterial agents have significantly improved their prognosis. Now the task is to narrow the indications for antibacterial treatment as much as possible and simplify it, make it targeted and less traumatic, safer and cheaper. Pediatricians must develop a system of self-control that would reduce the unnecessary use of antibacterial agents and reduce injuries and other undesirable manifestations of their use.

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