

MUCOLYTIC THERAPY IN PEDIATRICS: MYTHS AND REALITY

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ABSTRACT

The article discusses the problem of treating respiratory tract diseases in children, accompanied by the development of mucostasis and discrinia. In particular, mucolytic therapy with an original drug of the N-acetylcysteine group, which has both direct mucolytic, antioxidant and anti-inflammatory effects, is presented in detail. These properties are especially important in chronic bronchopulmonary pathology and explain its high effectiveness. Various dosage forms allow the doctor to use the drug in patients of different ages, including newborns and infants.

Keywords: respiratory diseases, mucostasis, discrimination, mucolytic therapy, children.

INTRODUCTION

Respiratory diseases in pediatrics still occupy a leading place, accounting for more than half of all diseases in children. Today it is not only a huge medical problem, but also a wide range of social issues [1]. The pathology of the upper respiratory tract is manifested by an inflammatory process in any paranasal sinus and has an acute and chronic course [2]. Difficulties in treating the lower respiratory tract are respiratory episodes complicated by the development of mucostasis not only during acute infections, but during a protracted course of the bronchopulmonary process, as well as with chronic bronchitis of various etiologies [3].

MATERIALS AND METHODS

The course of inflammatory diseases of the respiratory system in children has its own characteristics. Almost always they occur with pronounced hypersecretion of mucus, copious and viscous sputum, and an active cough, which is a protective mechanism that ensures cleansing of the bronchial tree.

It is traditional to classify drugs used for the treatment of respiratory diseases into mucoactive drugs, secretomotor drugs, mucoregulators (M-anticholinergic blockers), mixed-type drugs and mucolytics [4, 5].

- ◆ Mucoactive drugs according to their mechanism of action are divided into two groups:
 - drugs that stimulate expectoration (expectorants or secretomotor);
 - agents that regulate the rheological properties of sputum (viscosity and adhesion) - mucolytics, bronchosecretolytics, mucoregulators.
- ◆ Secretomotor means:
 - preparations of reflex action of plant origin (coltsfoot leaves, thermopsis herb, marshmallow roots, licorice, istoda, plantain leaf, violet herb, wild rosemary) and synthetic (sodium benzoate, terpine hydrate);

- preparations of resorptive or direct action of plant origin (anise fruit, thyme herb, essential oils of eucalyptus, peppermint) and synthetic (sodium and potassium iodide, sodium bicarbonate, ammonium chloride).

RESULTS AND DISCUSSION

◆ Mucolytics:

- non-enzyme preparations (N-acetylcysteines, carbocysteines, ambroxol hydrochlorides);
- proteolytic enzymes (deoxyribonuclease, ribonuclease, chymotrypsin, trypsin).

All of these dosage forms are used for mucolytic purposes or as expectorants, but have different chemical structures and mechanisms of action. Sometimes choosing the right drug for a pediatrician is a difficult task, but not only the effectiveness of the therapy, but also the overall recovery of the patient depends on it.

Of great importance in the treatment of conditions accompanied by the formation of viscous sputum is given to mucolytics, or so-called bronchosecretolytic drugs, since this group is capable of changing the rheological properties of sputum: viscosity, elasticity and adhesion/stickiness, which determines the possibility of its free release.

When prescribing mucolytics, it is important to take into account that they are not a means of influencing the main pathogenetic link of the disease - the inflammatory reaction, but only affect the symptoms of the disease, that is, they are means of symptomatic therapy [2]. A normal physiological (0.9%) sodium chloride solution or its hypertonic solution (5.6–7%) in the form of inhalations has a good mucolytic effect. Unithiol (sodium 2,3-dimercaptopropanesulfonate, belongs to the group of thiols), also used in the form of inhalations, has shown moderate mucolytic activity in practice [3].

Proteolytic enzymes are not currently used as mucolytics due to possible damage to the pulmonary matrix and a high risk of serious side effects such as hemoptysis, allergic reactions and bronchospasm. An exception is dornase-alpha, a special enzyme that is used in patients with cystic fibrosis [4].

In pediatric practice, a very important property of mucolytics is that, unlike antitussive expectorants such as marshmallow, thermopsis, ipecac, etc., they do not cause an increase in the volume of sputum and do not strengthen the gag reflex. In children (especially young children), the use of drugs that increase the volume of sputum is dangerous due to the possibility of developing the syndrome of “swamping” of the lungs, stagnation of sputum, reinfection of the respiratory tract, and in some cases even aspiration [4].

It is around this topic that myths are born among pediatricians that drugs, for example, from the N-acetylcysteine group, “swamp” the lungs! But that's not true! The reality is that if you correctly calculate the dose, select the regimen for taking the drug, and follow all the rules of breathing exercises and drainage, then it is impossible to overestimate the mucolytic and drainage effect of these drugs.

One of the representatives of this group is Fluimucil (N-acetylcysteine, Zambon, Italy), which has not only a direct mucolytic effect, but also antioxidant and anti-inflammatory [4]. This is an original drug that has been used in clinical practice for more than 30 years. Previously, drugs containing cysteine were prescribed for poisoning as antidotes. They did not have wider clinical use, since they had strong organoleptic properties (the smell of hydrogen sulfide). New

technologies have made it possible to create dosage forms that have high organoleptic characteristics. Today, N-acetylcysteine is quite widely used in medicine: by pediatricians, therapists, pulmonologists, cardiologists, diabetologists, nephrologists, and traditionally in toxicology.

The direct mucolytic property of N-acetylcysteine is associated with the effect of cysteine on the structures of glycoproteins that make up the mucus secreted by goblet cells. Mucolytics break down the disulfide bonds of acidic mucopolysaccharides. This leads to a decrease in the polarization of sputum mucoproteins, the gel layer of the secretion of goblet cells of the mucous membranes becomes more liquid, the adhesiveness of sputum decreases, which ensures its easier sliding and excretion along the bronchial tract, and accelerates mucociliary clearance. The antimicrobial or anti-inflammatory effect of the drug is based on the fact that cysteine reduces the adhesion of bacteria to epithelial cells and reduces the ability of microorganisms to colonize on the surface of the mucous membrane of the respiratory tract.

CONCLUSION

Thus, N-acetylcysteine in 5 different dosage forms is an effective direct-acting mucolytic, which has also proven itself as an active antioxidant and anti-inflammatory drug. Fluimucil has excellent organoleptic properties and is well tolerated by children. The variety of dosage forms allows the pediatrician to widely use the drug for various diseases of the respiratory system in both young children and adolescents.

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