THE PECULARITIES OF THE SOLID PHASE OF BRONCHOALVEOLAR LAVAGES IN CHILDREN WITH THE LUNG DISEASES

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ABSTRACT

The acute destructive pneumonias (ADP) occupy up to 80% of the total number of pneumonias. They require constant improvement of treatment strategy. Nowadays the use of surfactants is a part of most treatment protocols. The aim was to study the features of the solid phase bronchoalveolar lavage in children with the ADPs in the dynamics of complex treatment with exogenous surfactant.

Material and methods: We examined 39 patients of contaminated surgery. We identified 2 groups of patients. The patients of first group (n=27) had pulmonary pleural form of ADP, the second group (n=12) had pulmonary form of ADP. All patients got classical treatment and the earlier draining of pleural cavity. We used as an antiseptic reamberin 1.5% by 10 ml/kg and endobronchially injected exogenous surfactant BI in dose 12 mg/kg body weight a day, 6 mg/kg every 12 hours. All the children were made a bronchoscopy to obtain BAL to study the crystallization properties. The solid phase of BAL was studied by method of coneal dehydration.

Results: All facies before treatment were divided into two groups according to classification of facies of biological fluids. Only the facies of the second and the third types were detected there. It was revealed that the sizes of the zones of the facies were different in the comparison groups before treatment and after. And the level of crystalline structures and amorphous aggregates were different in the groups with different degrees of inflammation.

Conclusion: So, we can assume that the change in surfactant system is characterized by changes in the morphological structure of solids phases of BAL. And the morphological structure of BAL depends on the chemical composition of BAL.

UDC CODE & KEYWORDS

■ UDC: 616.24 - 002.31 - 07 ■ Bronchoalveolar lavages ■ Coneal dehydration ■ Lung surfucant system

INTRODUCTION

The acute destructive pneumonias occupy up to 80% of the total number of pneumonias (Michelow et al., 2004). They require constant improvement of treatment strategy for rapid recovery functions of aero-hematic barrier (Sahs, 2007). The methods of conservative treatment and "small" surgery are widely used for this purpose (Wexler et al. (2006). Nowadays the use of surfactants is a part of most treatment protocols (Hacimustafaoglu et al., 2004). They have capability to reduce the surface tension at the interface between the alveolar epithelium and the gas of alveoli spaces as well as reduce the risk of nonspecific pulmonary inflammatory responses (Chotigeat et al., 2008). The exogenous surfactants have a cytoprotective effect on all the structures of the tracheobronchial trunk and the alveolocapillary membrane. They stimulate the repair processes of the cellular elements of lung tissue, the mukosilliary clearance, synthesis of endogenous surfactant, alveolar macrophage phagocytosis. They link bacteria and viruses, as well as connect liposaharid Gram-negative bacteria. There is information that the role of exogenous surfactant as a modulator of the immune response is the stimulation of macrophage migration and phagocytosis and depression of proinflammatory cytokines TNF-a and Il-b (Michelow et al., 2004).

But when we use exogenous surfactant for replacement therapy in the treatment of the acute destructive pneumonias (ADP) we will have some difficulties. Therefore the question arises in choosing the method of the monitor diagnostics and subsequent monitoring of the appropriateness to use this medicine.

So it is necessary to conduct a further search of methods of control of the dynamics of pathophysiological mechanisms of disorders of the external respiration.

Therefore, many authors use BAL as a material for studying biochemical disorders and functional properties of surfactant (Picinin, Camargos, and Marguet, 2010).

Purpose of the work is to study the features of the solid phase of BAL in children with ADP in the dynamics of complex treatment with exogenous surfactant.

Materials and methods

We examined 39 patients (the age from 2–18; the mean age–6.8 years) of contaminated surgery. All the children were with newly diagnosed ADP and in serious and critical condition. We identified two groups of patients with the help of radiographic peculiarities. The patients of first group (n=27) had pulmonary pleural form of ADP, the patients of second group (n=12) had pulmonary form of ADP. The children of the first group were characterized by leukocyte count $16.2 \pm 0.6 \cdot 10^9/l$, the relative level of stabnuclear leukocytes above normal by 2.7 ($p < 0.05$) times. But the children of the second group were characterized by leukocyte count $23.4 \pm 0.6 \cdot 10^9/l$ and the relative level of stabnuclear leukocytes above normal by 3.5 ($p < 0.05$) times. 9 patients of this group had higher level of eosinophils and monocytes than normal level,

but the general amount of leucocytes was lower. All patients got classical treatment and the earlier draining of pleural cavity. We used as an antiseptic reamberin 1.5% by 10 ml/kg and endobronchially injected exogenous surfactant BI in dose 12 mg/kg body weight a day, 6 mg/kg every 12 hours. All the children were made a bronchoscopy to obtain BAL to study the crystallization properties. BALs were obtained twice -before and after treatment. The solid phase of BAL was studied by method of coneal dehydration (Tarasevich & Ayupova, 2003). We scanned the dried droplet (a facies) on the scanner EPSON Perfection V100 and measured using the program Universal Desktop Ruler. The results were being stored and processed using the program "Statistica 5.5" (AX908A290603AL).

Results and discussion

All facies before treatment were divided into two groups according to our classification (Tarasevich & Ayupova, 2003). Only the facies of the second and the third types were detected there. The second type of facies characterized the children of the first group (17 people) and 5 people in the second group. Area of the central zone (CZ) was 44.4% (39.3% / 53.5%) and the peripheral zone (PZ) was 55.6% (51.0% / 62.5%) of all of the total area. This ratio of zones corresponds to the II type (Figure 1).

Figure 1: Morphological picture of the facies of BAL in patients of the first group

Source: Authors

The other children of the second group (69 people) had facies with the peripheral zone—46.3% (38.4% / 50.3%), the transition zone (TrZ)—32.2% (27.2% / 39.5%) and the central zone—21.5% (18.6% / 28.4%). This ratio of zones corresponds to the III type (Figure 2).

Figure 2: Morphological picture of the facies of BAL in patients of the second group (before the treatment)

Source: Authors

These patients were treated with exogenous surfactant and in 3 days we made a bronchoscopy again.

The children of the both comparing groups received standard treatment. The patients, treated with exogenous surfactant, had facies with other morphological structure: PZ—38.3% (32.4% / 43.3%), TrZ—12.2% (7.2% / 19.5%) and CZ—49.5% (42.6% / 56.4%) (Figure 3).

Figure 3: Morphological picture of the facies of BAL in patients of the second group. (during the treatment)

Source: Authors

The patients who were not treated with exogenous surfactant had wheezing, hyperthermia and purulent sputum with pleural drainage.

Conclusion

So, we can assume that the change in surfactant system is characterized by changes in the morphological structure of solids phases of BAL. And the morphological structure of BAL depends on the chemical composition of BAL.

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