

## The Meaning of Pulmonary Reflexes in the Pathogenesis of Acute Pneumonia

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### Abstract

The research was conducted in the clinic of pediatric surgery (city Novokuznetsk, Russia) in the year 1982 to 1985 in patients with severe AP in the initial period of the disease. At that time children with the most aggressive forms of AP were selectively admitted to our department. Cervical vagosympathetic blockade (CVB), Cups therapy (CupT) and Cold wet wraps procedures has been used. The effectiveness of procedures was evaluated by using comparative rheopulmonography (RPG).

**Keywords:** Acute pneumonia; Cervical vagosympathetic blockade (CVB); Cups therapy (CupT); Cold wet wraps

### Introduction

To the present time, obtained much evidence of the important role of lung reflexes in the development and course of acute pneumonia (AP). However, studies in this direction are mostly experimental and their clinical application is not even discussed [1-12]. I would like to offer the results of my research, which was published originally in Russian [13,14,15], and that may be interesting and informative for experts dealing with the problem of AP.

### Material and Methods

The research was conducted in the clinic of pediatric surgery (city Novokuznetsk, Russia) in the year 1982 to 1985 in patients with severe AP in the initial period of the disease. At that time children with the most aggressive forms of AP were selectively admitted to our department. The reason for the hospitalization was the fact that the surgical clinic was the only place in our area for intensive care. This group of patients differed high mortality and fast development of pleural complications. Unsatisfactory results of conventional treatment (massive doses of antibiotics, oxygen supply, and intravenous infusion) forced us to find ways to solve the problem.

The following procedures have been used as a means of first aid in patients on admission.

1. Cervical vagosympathetic blockade (CVB) performed with 0.25% solution of novocaine on the side of inflammation. This type of blockade was allowed for clinical use and widespread in the Soviet Union, where the work was performed. These blockades were mainly recommended for carrying out differential diagnosis between abdominal syndrome of AP and acute appendicitis in children.
2. Cups therapy (CupT) performed at the rate of 1 cup (50 cubic centimeters) to 4 kg body weight.
3. Cold wet wraps the body within a few minutes. This procedure is usually performed in patients with hyperthermia to the normalization of the temperature.

The effectiveness of procedures was evaluated by using comparative rheopulmonography (RPG). Record indicators was carried out prior to and immediately after the procedure. The electrodes for recording were applied on the side of the chest wall at the level of 3 ribs to 4 ribs. Electrodes remained in the same place for the implementation of re-recording. Recording was carried out on the RPG-4 unit, "Elkar" (USSR). The age of patients these studies ranged from 3.5 years to 14 years. Comparative RPG parameters were recorded in 22 children after CVB and in 14 children after the CupT. The effectiveness of cold wraps according to clinical signs was the most demonstrative, but we were not able to record the objective results.

Comparative RPG allowed evaluating the respiratory rate (RR), respiratory volume (RV), minute volume of ventilation (MV), heart rate (HR), and systolic wave amplitude (SA), and minute pulsatory blood flow (MBF), coefficient of ventilation-perfusion ratio (Kv/p). The results were subjected to statistical processing.

### Results and Discussion

Comparative RPG study was objective evidence of the effectiveness of CVB and CupT. Thus, indicators of RR and MV significantly decreased after the procedure, although RV remained unchanged. Performance SA, MBF has changed markedly, HR decreased to a lesser extent. In general, the received data reliably indicated a decrease of hyperventilation and improving perfusion. Baseline RPG indicated marked predominance indicators ventilation over the bloodstream. Following treatment procedures, the ratio between these parameters (Kv/p) align. This point was accompanied by a significant improvement in the condition and well-being of patients.

The obtained results allowed us to evaluate the mechanisms of the development of the disease process in AP from new positions. Suddenly emerging center of inflammation causes reflectoric respiratory frequency excursions. Simultaneously reflectoric spasm of lesser circulation impedes the blood flow and causes delay and disruption of blood perfusion on the periphery. Violation of metabolic processes is the next link after the changes in the systemic circulation. Metabolism perversion serves as an additional incentive to compensatory increase in ventilation. Therefore, according to the original RPG, ventilation rates prevailed over the blood flow rates (Kv/p more than 1).

The above-described changes in the peripheral circulation correspond to the picture "shock". Therefore homeostasis violations at AP; we were treated as "pulmonary shock". Treatment methods to eliminate those violations were named "anti-shock procedures" [12-15].

Performing SVB liquidates the reflectoric effect of inflammatory focus on the pulmonary vessels. This effect allows the body to eliminate violations of the central hemodynamics. The results of comparative RPG after CVB and after the CupT had no significant difference. However, the mechanism of action of the CupT seems to be different. Cups application extracts part of circulating blood and reduces venous return. This step unloads the vessels of the small circle and probably removes them from spasm. A similar mechanism will probably have cold wraps. This procedure also facilitates partial blood sequestration and pulmonary vascular unloading.

The presented above results have helped the author (along with other studies) to review the AP pathogenesis. Described first aid techniques entered in the obligatory treatment set of AP. The combination of innovations has achieved impressive results of treatment of AP and declares the possibility of guaranteed prevention of its purulent and destructive complications [15].

This study was done by applying primitive equipment, but the results remain interesting today. Modern technology allows to conduct a similar study on a more detailed level and to get important information.

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