**RETROSPECTIVE ANALYSIS LUNG**

**COMPLICATION IN CHILDREN WITH CONGENITAL HEART DISEASES OPERATED WITH CARDIOPULMONARY BYPASS**

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***Key words****: lung complication, congenital heart diseases, cardiopulmonary bypass, risk factors*

 One of the important issues arising in the early postoperative period after "open" heart surgery with cardiopulmonary bypass (CBP) is breath function disorder, the so called "respiratory distress syndrome" occurring in 8-10% of cases, mortality equalling to 25%. The western medical sources give the terms "respiratory distress syndrome" and "hyaline membrane disease" as synonyms. So, the above-mentioned forms of respiratory disorders (scattering atelectases, edemo-hemorrhagic syndrome, and hyaline membrane disease) constitute the same pathological process. The latter is connected with generalized inflammatory response and the immune system dysfunction as reactions to anesthesia, extensive surgery and CBP. These may in their turn lead to increased capillary penetration that may well cause a generalized edema, acute respiratory distress syndrome, multiple organ dysfunction with increased mortality in the postoperative period.

 It is medically proved that the CBP as well as the aorta clamp duration are the risk factors for lung complications appearance [4].

 The studies by D. Milot prove that transfusion anamnesis is an independent predictor of acute lung injury in patients undergoing cardiac surgery [5].

  A prolonged artificial lung ventilation (mechanical ventilation) was conducted in patients with hemodynamic instability and multifactorial complications.

**The article objective** is to analyze the risk factors for lung complications appearance in children with congenital heart diseases operated with cardiopulmonary bypass in the postoperative period.

**Materials and methods**. Since 2012 to 2015 333 patients with CHD have been examined and operated with cardiopulmonary bypass in GI "National Institute of Cardiovascular Surgery in the of/named after Amosov» of NAMS of Ukraine. The children's age ranged from 0.03 to 37.0 months, a median constituting 10.0 months, with interquartile swing [Q25%; Q 75%] ranging from 4 to 17 months. The children's weight ranged from 3 to 15 kg, a median constituting 8.20 kg, with interquartile swing ranging from 5.2 do10,5 kg. Within the aorta clamp duration a median constituted 30 minutes, interquartile swing [Q25%; Q 75%] ranged from 12.5 to 60.5 minutes. Within the CBP duration a median constituted 71 minutes, interquartile swing [Q25%; Q 75%] ranged from 46 to 127 minutes.

  The aorta clamp, the CBP and the artificial (mechanical) ventilation duration as well as postoperative lung complications were statistically estimated.

  The complications appearance frequencies contrasting was performed according to "χ2" Pearson criterion and Fisher criterion.

**Results and discussion**. Within the three years of statistical studies 123 (36.7%) complications were found in 333 patients with CHD operated with CBP, 63 (18.8%) cases constituting lung complications listed in Table 1. The death rate equalled to 11 patients ( 3.2%).

 Table 1

|  |  |  |  |
| --- | --- | --- | --- |
| **№** | **Complications** | **Case Rate** | **%** |
| **1** | Atelectasis | 10 | 3,0 |
| **2** | Pneumonia | 15 | 4,5 |
| **3** | Respiratory disorders | 38 | 11,3 |

The postoperative course complications depending on heart diseases are listed in Table 2. The statistical study group didn't include 60 patients because of scanty case rate.

 Table 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  **Indicators** |  **Respiratory disorders** |  **Atelectasis** |  **Pneumonia** |  **Without lung complications** |
| ASD | 4 (6,9%) | 0 (0%) | 1(1,7%) | 53 (91,4%) |
| VSD, PH | 15(14,7%) | 1(1%) | 4(3,9%) | 82 (80,4%) |
| PAPVC | 2(14,3%) | 0(0%) | 1(7,1%) | 11(78,6%) |
| AVSD | 3(15,7%) | 1(5,3%) | 1(5,3%) | 14 (73,7%) |
| DORV | 1(16,7%) | 0(0%) | 1(16,7%) | 4 (66,6%) |
| ТoF | 3(9,7%) | 0 (0%) | 1(3,3%) | 27 (87%) |
| ТGA | 3(15%) | 0 (0%) | 2(10%) | 15 (75%) |
| ТАPVC | 0(0%) | 1(20%) | 0(0%) | 4 (80%) |
| HLHS | 2(11,1%) | 1(5,6%) | 1(5,6%) | 14 (77,7%) |

According to Table 2, lung complications occurrence in AVSD 26.3%, TGA 35% was more frequent that was connected with the disease complexity and its correction.

To investigate the effect of the aorta clamp duration and the CBP total duration the patients were divided into two groups: Group 1 — the aorta clamp duration ranging from 10 to 60 minutes, the CBP duration — from 40 to 99 minutes; Group 2 — the aorta clamp duration ranging from 61 to 130 min, the CBP duration — from 100 to 200 minutes. The data are given in Table 3.

The statistical study didn't include 54 patients whose aorta clamp duration was lesser than 10 minutes.

Table 3 The lung complications frequency dependence on the aorta clamp and the CBP duration

|  |  |  |  |
| --- | --- | --- | --- |
| **Indicators** | **Group 1(n – 195)** | **Group 2( n – 84)** | **P** |
| Respiratory disorders | 24 (12%) | 8 (9,5%) | NS\* |
| Atelectasis | 2(1,02%) | 2 (2,4%) | NS\* |
| Pneumonia | 5 (2,6%) | 7 (8,3%) | 0,02 |
| All | 31(15,9%) | 17 (20,2%) | NS\* |
| Mortality | 3 (1,5%) | 8 (9,5%) | 0,005 |

The Group 2 patients' lung complications frequency was higher than that of the Group 1.

Table 4 The lung complications frequency dependence on the artificial (mechanical) ventilation duration

|  |  |  |
| --- | --- | --- |
| **Time** | **Lung complications** | **Without lung complications**  |
| 1-6 hours | 13(6,9%) | 175(93,1%) |
| 7-12 hours | 7(14%) | 43 (86%) |
| 13 and more hours | 37(40%) | 56 (60%) |

The statistical study didn't include 2 patients of the Group because of acute heart failure, acute respiratory failure that resulted in death.

**Conclusions**: 1. The lung complications number is significantly stipulated by the congenital heart disease complexity and its correction causing the aorta clamp and CBP duration increase.

2. The aorta clamp and CBP duration statistically significantly effects the pneumonia incidence in the early postoperative period.

3. A statistically significant postoperative mortality dependence on the CBP duration was also observed.

4. A prolonged artificial (mechanical) ventilation in the postoperative period increases the lung complications number that in its turn may extend the artificial ventilation need.

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