

## Medical Manifestations of Heart Defects and its Bronchopulmonary Complications

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**Abstract:** In recent times, global cardiac surgery has tended to increase the number of operations performed in the neonatal period. In many respects, this trend is associated with the improvement of early diagnosis of congenital pathology of the cardiovascular system, including prenatal, as well as the improvement of treatment methods for breastfed infants. One of the main tasks of public health today is to reduce the mortality rate among newborns after this cardiac surgery. The outcome of surgical treatment in a group of newborns is influenced not only by the quality of surgical technique, perfusion, anesthesia, and breastfeeding, but also by the individual characteristics of each infant. Bronchopulmonary diseases are the leading cause of postoperative illness and postoperative death, along with acute heart failure. The most common respiratory complications in the postoperative period are atelectasis, pleural effusion, diaphragmatic dysfunction, and pneumonia.

**Keywords:** atelectasis, neonatal period, Bronchopulmonary diseases, eosinophilic infiltrate.

Bronchopulmonary complications remain the leading cause of postoperative morbidity and lengthen the patient's hospital stay, increasing the cost of treatment. Three postoperative autopsy studies reported 5% to 8% of respiratory causes of death, such as pulmonary embolism and ARDS. In a study of groups of 51, 351 patients who underwent CABG (coronary artery bypass grafting), pneumonia was noted in 0.78%, ARDS - in 4.86%, and in 2.96% there were other bronchopulmonary complications [18].

According to M.D. Knyazeva, R.A. Stegailo (1978) complications such as pleurisy, bronchitis, pneumothorax and pneumonia after CABG accounted for 7.3% of cases, proceeded without any peculiarities; treatment was carried out according to the generally accepted plan [1]. Taking into account the differences in the formulation of postoperative bronchopulmonary complications and based on modern publications on this topic [18, 22], we propose to classify the following pathological conditions as postoperative bronchopulmonary complications:

- pneumonia, pleurisy, tracheitis, requiring antibiotic therapy;
- ARDS (acute respiratory distress syndrome);
- atelectasis;
- pleural effusion;
- diaphragmatic dysfunction;
- pulmonary embolism;
- pneumothorax and segmental lung collapse;
- mediastinitis and sternum infection;
- Pulmonary edema.

Mediastinitis and sternal infection are classified as respiratory complications due to their significant destructive contribution to respiratory function.

The problem of bronchopulmonary complications after cardiac surgery in children is related to the incidence of sternum dehiscence after Jatene arterial switch operations in newborns and chylothorax,

as well as plastic bronchitis [plastic bronchitis is a rare, potentially life-threatening condition that leads to acute pulmonary insufficiency, in which bronchial obstruction occurs. protein casts from fibrin and dense cellular eosinophilic infiltrate (type 1) or mucin (type 2)] and pulmonary arteriovenous malformations after hemodynamic correction of the single ventricular heart of Fontaine, Glenn [20].

In patients with postoperative vocal cord paralysis, pulmonary complications are more common [16]. Pulmonary complications also develop in heart transplant recipients - in 31.3% of survivors during the first 6 months [3].

The relatively high incidence of respiratory complications is explained by the close relationship between the heart - the site of surgery - and the lungs, as well as the prevalence of concomitant bronchopulmonary diseases such as COPD (chronic obstructive pulmonary disease) and pulmonary dysfunction secondary to heart disease (CHF - congestive heart failure). ).

Recent studies have also linked the risk of developing pulmonary dysfunction to the polymorphism of the tumor necrosis factor locus and the interleukin-6 gene promoter. Cardiac surgery, depending on the type of thoracotomy and the purpose of the intervention, can be very traumatic for the lungs, pulmonary arteries, and phrenic nerve. Cardiopulmonary bypass has a variety of side effects. It contributes significantly to the likelihood of developing a systemic inflammatory response.

The following factors at different stages of the treatment process can determine and mutually aggravate bronchopulmonary complications [5, 9, 11, 13, 14, 15, 18]:

- pneumonia, pleurisy, tracheitis, requiring antibiotic therapy;
- ARDS (acute respiratory distress syndrome);
- atelectasis;
- pleural effusion;
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The following factors at different stages of the treatment process can determine and mutually aggravate bronchopulmonary complications [5, 9, 11, 13, 14, 15, 18]:

1. clamping of the aorta;
2. cardioplegia;
3. local cooling of the heart;
4. the absence of periodic inflation of the lungs during the operation;
5. mechanical ventilation;
6. dysfunction of the kidneys and gastrointestinal tract (gastrointestinal tract);
7. pain;
8. imbalance of fluids and electrolytes;
9. drains;
10. reduced mobility after surgery;
11. undetected inadequately sanitized foci of chronic infection;
12. inadequately compensated chronic diseases;
13. preoperative use of bronchospastic drugs (for example, beta-blockers and inhibitors of angiotensin-converting enzyme (ACE inhibitors) and muscle relaxants (pancuronium);
14. oppression of the respiratory center by opioids; alcohol consumption; smoking before surgery;
15. GER (gastroesophageal reflux) and postoperative vomiting with possible aspiration;
16. overload with blood transfusion products;
17. Sensitization reactions.

Significant impairment of pulmonary function is more likely in patients with:

- any chronic disease involving the lungs;
- a history of smoking, persistent cough and / or wheezing;
- deformities of the chest and spine;
- severe obesity;
- need for one-pulmonary anesthesia or lung resection;

Severe neuromuscular disease.

Many patients undergoing surgery for cardiac surgery have overt or latent chronic obstructive pulmonary disease (COPD), since cigarette smoking is a significant risk factor for coronary artery disease. Warner M.A. et al (1989) found that patients who quit smoking less than 2 months before CABG had a rate of pulmonary complications almost four times higher than patients who quit smoking more than 2 months before the intervention (57.1% compared to 14.5%). Patients who stopped smoking more than 6 months before surgery had a complication rate of ~ 11%, similar to those who never smoked. Similar to Ngaage D.L. et al (2002) noted that postoperative complications were twice as common in smokers (29.5%) than in nonsmokers (13.6%) and excursionists (14.7%) [18].

In addition to the antecedent conditions that predispose to the development of postoperative pneumonia, the postoperative conditions themselves also matter. These include the regular occurrence of atelectasis after cardiac surgery together with poor coughing due to pain, renal failure, and old age.

Postcardiac, neurologic, and cognitive impairment may also contribute to pneumonia by promoting passive aspiration secondary to pharyngeal dysfunction. Postoperative pneumonia causes a range of problems, from fever and productive cough to acute respiratory decompensation requiring prolonged mechanical ventilation. Diagnosis of pneumonia by x-rays can be complicated by concomitant atelectasis and pleural effusions. Thus, the need to suspect pneumonia in patients with productive sputum and fever is justified.

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