

ABSTRACT

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The dissertation thesis “Surgical care improvements in congenital malformations of the cardiovascular system” presented for the degree of Doctor of Philosophy (PhD) by specialty 6D110100 – Medicine

Actuality of the thesis: Congenital heart defects (CHD) are an important problem in pediatrics and cardiac surgery. The importance of this problem is based on its high prevalence. Significant health impairments associated with CHD limit the activity of the sick children and thus necessitate their early surgical correction (Bokeria L.A., Sarsenbayev G.I., 2008; Gadaev A.S., 2011).

According to different authors CHD are found in 0.7-1.7% of newborns. According to World Health Organization (WHO), congenital heart disease occurs in 1% of newborns, regardless of the quality of medical care in the country (Kobrin B.A., 2001). The range of identified CHD incidence varies widely from 2.4 to 14.15 per 1000 live births (Sharykin A., 2009). In Kazakhstan, each year born about 3,000 children with CHD, from whom 80% die before the age of one year, up to 27% during the first month and up to 20% during the first weeks of life. The percentage of birth and detection of children with this pathology is increasing each year (Tulegenova A.G., 2012).

In accordance with the presented data, reduction of mortality from CHD in infants and improvement of prognosis for recovery in the newborns are among the unsolved and important issues in pediatric cardiac surgery, pediatric surgery and pediatrics. Thus, an improvement of surgical care of the newborns and infants with CHD is an actual question, which demands a scientific research in this area.

Purpose: The research purpose was to study the impact of congenital heart defects (CHD) on perinatal and infant mortality and improvement of the specialized surgical care.

Objectives:

1. To determine the prevalence and character of congenital heart defects in infants, Zhambyl regions.
2. To study the risk factors associated with CHD.
3. To examine the immediate causes of death in newborns and infants with CHD, Zhambyl regions.
4. Improvement of surgical care in newborns and infants with CHD.

Study object: infants and children under 1 year of age in whom CHD was diagnosed for the first time in life.

Study subject: CHD, echocardiography, ECG and chest X-ray.

Study design: A retrospective, descriptive case-control study.

Scientific novelty of study results: For the first time, the data on the prevalence and character of CHD in infants and young children in Zhambyl region have been presented based on a comprehensive, retrospective study. The most common CHD (ventricular septal defect, patent foramen ovale atrial septal defect and secondary atrial septal defect) have been studied in detail and analyzed. Medical, biological,

social and hygienic risk factors and causes of CHD mortality in infants and young children have been established. Surgical care in preterm infants with patent ductus arteriosus has been refined and improved.

Practical significance: The data on prevalence and character of CHD in children under 1 year may serve a basis for development of regional programs on improvement of cardiac care for such patients.

The results of the study can be used to improve the quality of health care in health organizations at all levels in Zhambyl region. Also, the results suggest the need to maintain a common register and monitor the CHD patients. In addition, timely surgical care using "ligation" in premature infants with Patent Ductus Arteriosus (PDA) reduces the pre- and postoperative complications and mortality. Therefore, it is the basis for the improvement of surgical care.

Key issues of the thesis:

1. According to the prevalence of CHD in children under one year, the following defects are the most common: ventricular septal defect, patent foramen ovale atrial septal defect and secondary atrial septal defect.

2. The most important CHD risk factors in children are the following: the age of parents, number of pregnancies, infectious and inflammatory diseases of the mother during pregnancy, intrauterine infection. Less important, but still quite prominent CHD risk factors are the following directly pregnancy related conditions: pronounced toxicosis, toxemia of pregnancy (gestosis), anemia.

3. The main causes of death of infants are often associated with the combined complex heart diseases and complications arising during surgical correction, or during postoperative period.

4. Timely provided surgical care using "ligation" in premature infants with Patent Ductus Arteriosus (PDA) reduces the pre- and postoperative complications like bronchopulmonary dysplasia (BPD), infant respiratory distress syndrome (IRDS) and necrotizing enterocolitis, and mortality. Thus, the above is the basis for the improvement of surgical care.

Presentation of the results: The key issues of the thesis were presented and discussed at a joint meeting of the department of "Traumatology, orthopedics and oncology," protocol №9, April 29, 2016. The thesis materials were presented at the International Scientific-Practical Conference of the 9th European Conference on Biology and Medical Science" (Vienna, Austria, March 5, 2016) and at the 55th International Scientific-Practical Conference "Modern medicine: current issues" (Novosibirsk, Russia, May 4, 2016.).

Publications: Eight manuscripts related to the thesis were published. The publications include one in the Scopus database journal, three publications in the editions recommended by the Committee for Control in Education and Science and four publications as a part of the materials of Austrian, Russian and Kazakh international conferences.

Conclusions:

1. The detected prevalence of CHD in young children in Zhambyl region, during the period of 2014 - 2015 was 9.0 ± 1.2 per 1000 children and had no significant gender difference (girls - 53%, boys - 47%). The most common of the CHD was an

isolated ventricular septal defect (4.8 ± 0.5 per 1000 children), atrial septal defect (0.45 ± 0.1) and tetralogy of Fallot (0.45 ± 0.1). The common CHD among the preterm infants was patent ductus arteriosus (2.3 ± 0.1). The prevalence of this CHD in the preterm infants was 6 times higher than in the normal population (0.38 ± 0.08).

2. The following medical and biological factors were the most important CHD risk factors in children: gestosis and fetal infection (2.9 ± 0.7 in study group vs. 1.7 ± 0.5 in control group; $p < 0.001$), pregnancy interruption (12.5 ± 0.4 in study group vs. 5.1 ± 0.2 in control group; $p < 0.001$), acute respiratory viral disease (18.3 ± 0.7 in study group vs. 10.8 ± 0.3 in control group; $p < 0.001$), chronic pyelonephritis (study group = 8.8 ± 0.3 vs. control group = 2.7 ± 0.5 ; $p < 0.001$) and preeclampsia hypertension (4.4 ± 0.1 in study group vs. 2.7 ± 0.5 in control group; $p < 0.001$). According to the results of our study anemia in the pregnant women is the leading risk factor for CHD.

3. The analysis of infant mortality in Zhambyl region during the period of 2014-2015 revealed that the constituting part of congenital heart and blood vessels diseases increased 1.8 times in the overall infant mortality rate (8.3% - 2014, 14.1% - 2015). The most frequent causes of death and risk factors in young children were the following conditions causing CHD: transposition of the great vessels, aortic narrowing (coarctation), pulmonary artery atresia and ventricular septal defect (VSD).

4. Ineffective lung ventilation, mandatory conservative and pharmacological treatment is an indication for surgical treatment in hemodynamic PDA in preterm infants with CHD. In addition, not closed hemodynamically implicit PDA in the first year of life is a direct indication for surgery. Timely surgical correction of hemodynamic explicit PDA in preterm infants shortens the mechanical ventilation time and prevents complications. Use of surgical "ligation" in premature infants with PDA reduces postoperative complications and mortality. Thus it is the main method of treatment.