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Clinical-morphological features of congenital anomalies of the development of small intestine in the regions with different intensity of the use chemical plant protection products

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Abstract
The risk of the birth of children with malformations of the small intestine has a high degree of correlation with the problems of water supply of the population existing in some regions and the intensity of the use of chemical plant protection products. Surgical methods of treating this pathology in the most unprotected group of surgical patients – in newborn babies are extremely difficult to tolerate any therapeutic and diagnostic interventions, have limited prospects and opportunities. Solving the problems associated with malformations of the small intestine in newborns should be carried out with preventive measures.

Keywords: newborn babies, small intestine, morphology, developmental anomaly, pesticide, surgical tactics

Introduction

In the mammalian, human body in particular, the small intestine, which is located on the border of the external and internal environments of the organism, provides homeostasis, harmonious activity of all functional systems of the organism due to the perfect integration of the body's regulatory systems, the dynamic inverse relationship of the central and peripheral links [4]. The immune, endocrine and nervous systems of the small intestine are developed structural-functional formations that ensure the interrelation of the digestive and other systems when digestion and absorption of proteins, fats and carbohydrates, regulation of the level of nutrients and ions in the blood, penetration of antigens both food and microbial of origin [3, 8, 10]. However, despite the establishment of general regularities in the functioning of regulatory systems in internal organs, the idea of their formation and integration of various levels of its organization is fragmentary, the mechanisms of the space-time relationship in the dynamics of age, before and after birth, with the regulation of the homeostasis of the internal environment of the organism [5, 8].

Until now, the questions of the sequence of their morphofunctional formation and the features of their integrative activity, their influence through the mother's organism, and the reactivity of regulatory structures remain insufficiently studied. Separate works on the study of the effect of various poisoning chemical substrates and pesticides that come with the milk of nursing females do not allow us to disclose these mechanisms [6, 9].

Disclosure of the regularities of development and formation in physiological conditions and under the influence of unfavorable factors of the external environment has great theoretical and applied significance.

According to the literature, one of the main factors that pollute the environment (biosphere) at the moment is pesticides. The effect of unfavorable environmental factors during the formation of organs and systems in ontogenesis is often the cause of various congenital anomalies of development. With the development of surgery of congenital malformations of the gastrointestinal tract, the improvement of neonatology, modern prenatal diagnosis of malformations, in recent years, the survival rates of newborns with congenital intestinal obstruction have been proved [1, 4, 7]. The problem is still unsolved, due to the diversity of clinical and anatomical variants of malformations, the choice of tactics and the duration of surgical treatment of partial intestinal obstruction, including in isolated malorotation of the duodenum [3, 5]. The most severe group of patients are newborns with combined and multiple developmental defects complicated by curvature and necrosis of intestine, intrauterine perforation, meconium peritonitis [3, 6].

Aim of the Investigation

The study of clinical and morphological features of congenital anomalies of the small intestine in newborns in regions with different intensity of application of chemical plant protection products and the results of their surgical treatment.

Material and methods of investigation

The material of the study was the small intestine of operated sick newborn with congenital anomalies of the small intestine in the Department of Neonatal Surgery of SamMI Clinics № 2 for the period from 2009 to 2017. The subject of the investigation was a comprehensive study of the features of the clinic, treatment and morphology of congenital small intestine obstruction in newborns. During the study we used general histological, epidemiological, general clinical (ultrasound, roentgenography, irrigography, etc.) research methods.

Results of the Study and Their Discussion

The intake of pesticides in the organism of pregnant rabbits and, the intrauterine effect of these chemicals on the fetus that is being formed can cause congenital developmental anomalies, including the intestinal tube. During the study the incidence of congenital small intestinal obstruction in newborns in different regions of the Samarkand region, we determined higher rates are observed in areas with a high risk

of negative effects of pesticides, i.e. with irrigated farmlands with a relatively low level of supply of tap water, intensive use of plant protection against insects and pests. It is obvious that the level of pesticide intake into the human body is through drinking water.

For 2009-2017 years the number of newborns registered in the Samarkand region with an anomaly of development of the small intestine was 171 cases for 656289 live births. The overall incidence of congenital small intestinal obstruction in the Samarkand region is 1 per 3838 births. In areas with the highest risk of pesticides action, this indicator was 1 for 3519 live births, and in the region by centralized water supply and low application of agrochemicals, this indicator was noticeably low – 1 / 5683,1.

In order to solve the objective, we studied the results of surgical treatment of 171 newborns with congenital small intestinal obstruction hospitalized in the 2nd clinic of SamMI for this period. From 171 hospitalized in the 2nd SamMI clinic with this pathology for the period from 2009 to 2017, boys were 107 (62,6%), girls – 64 (37,4%). In the structure of the causes of the disease, atresia of various types predominated (figure 2), which occurred in 135 (78,9%) operated infants. Stenosis of the small intestine was 7 (4,1%). Malrotation was diagnosed somewhat more often (26 (15,2%)), ileus on the gut doubling (figure 2) was noted only in 3 (1,8%) of newborns, 2/3 of the defects were attributed to abnormalities of the jejunum, the remaining 1/3 were due to ileum.

Fig 1: Atresia of jejunum.

Fig 2: Segmental Doubling of Small Intestine.

When a child enters a specialized department of surgery, a newborn in the 2nd clinic of Sam MI, along with an assessment of the clinical picture of the disease, required radiographs of the abdominal cavity in the vertical position of the child. For this defect, the characteristic radiographic semiotics is the presence of multiple horizontal fluid levels in the stretched loops of intestine. Irrigography was performed for limited indications with suspected dynamic intestinal obstruction, acute form of Hirchsprung's disease and malorotation. Water-soluble X-ray contrast preparations were used for irrigography. A characteristic sign of congenital small intestinal obstruction on irrigograms is, so-called, the "microcolon" symptom (figure 3).

Diagnostic procedures were carried out in parallel with short preoperative preparation within 12-24 hours. At the same time, hemodynamics, respiration, body temperature, diuresis were monitored, an oro- or nasogastric tube for decompression of the stomach was established, infusion therapy was started, aimed at correcting the acid-base state and electrolyte disturbances and eliminating hypovolemia.

Fig 3: Irrigography: microcolon against the background of sharply inflated intestine loops.

As the operative approach, right-sided transrectal laparotomy (in 140 – 81,9% of cases) was used in most children, and the upper (in 23 – 13,5% of cases) and mid-median laparotomy (in 8 – 4,7% of cases) interventions were used less frequent.

During the choice the tactic of surgical treatment, babies with congenital intestinal obstruction were given preference for one-stage radical interventions – primary formation of small intestine – small intestinal anastomoses and membrane excision, which were performed in 134 (78,4%) patients (table 1). In the presence of cord-like atresia of the underlying parts of the small intestine (figure 4), as well as in patients with diffuse peritonitis, it was necessary to perform the first stage of excretion of ileo- or einostomies (in 37 – 21, 6% cases).

Table 1: Types of surgical interventions in congenital obstruction of small intestine, n=171

Type of intervention	abs.	%
Anastomosis between intestines	99	57,9
Formation of stoma	37	21,6
Membrane excision	35	20,5

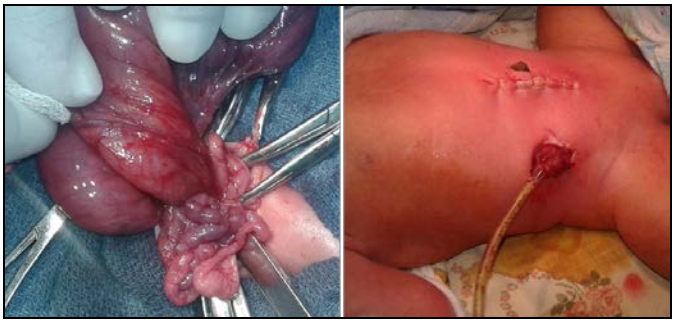

Fig 4: Cord-like atresia of the small intestine – formation of ileostoma was carried out.

During the mismatch of diameter of the cross-linked segments of the intestine less than a centimeter, we tried to perform an end-to-end anastomosis, and with a more pronounced discrepancy we tried to perform an end-to-side anastomosis.
Complications of the postoperative period included (table 2): pneumonia, noted in 73 (42,7%) of newborns, adhesive intestinal obstruction – in 37 (21,6%), wound suppurations – in 17 (9,9%), long-term paresis intestine – in 13 (7,6%), insufficiency of the joints of the intestinal anastomosis – in 10 (5,8%) and evagination of the stoma – in 4 (2,3%) of neonates.

Table 2: Complications after surgical interventions on congenital obstruction of small intestine, n=171

Complication	abs.	%
Pneumonia	73	42,7
Adhesive intestinal obstruction	37	21,6
Wound suppuration	17	9,9
Long-term paresis intestine	13	7,6
Insufficiency of the joints of the intestinal anastomosis	10	5,8
Evagination of the stoma	4	2,3

Postoperative mortality in newborns with congenital small intestinal obstruction was 25,7% - 44 children died. In the structure of the immediate causes of death, pneumonia (25) and associated defects (12) and peritonitis (7) were predominated.
In newborns with congenital anomalies of the small intestine in the jejunum wall, as in the experimental animals, hypoplasia of the small intestine and its wall structures is observed which is a consequence of the toxic effect of the pesticide on the processes of morpho- and organogenesis and differentiation of structures, the formation of functional systems, the processes of integration and adaptation. This testifies about the influence of pesticides on the function and morphology of organs, not only in direct contact with it, but also on the formation and formation of internal organs, affecting also through the mother's organism.

Conclusions

The risk of the birth of children with malformations of the small intestine has a high degree of correlation with the existing problems of water supply of population in some regions and the intensity of the use of chemical plant protection products. Despite the development of organizational and technological capabilities of neonatal surgery, neonatology, anesthesiology and resuscitation, the level of postoperative complications and mortality in these malformations remain high. Obviously, surgical methods of treatment this pathology in the most unprotected group of surgical patients – in newborns, extremely difficult to tolerate any medical and diagnostic examinations and interventions, have limited perspectives and opportunities. Therefore, the solution of the problems associated with malformations of the small intestine in newborns should be increasingly transferred to the plane of preventive measures.

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