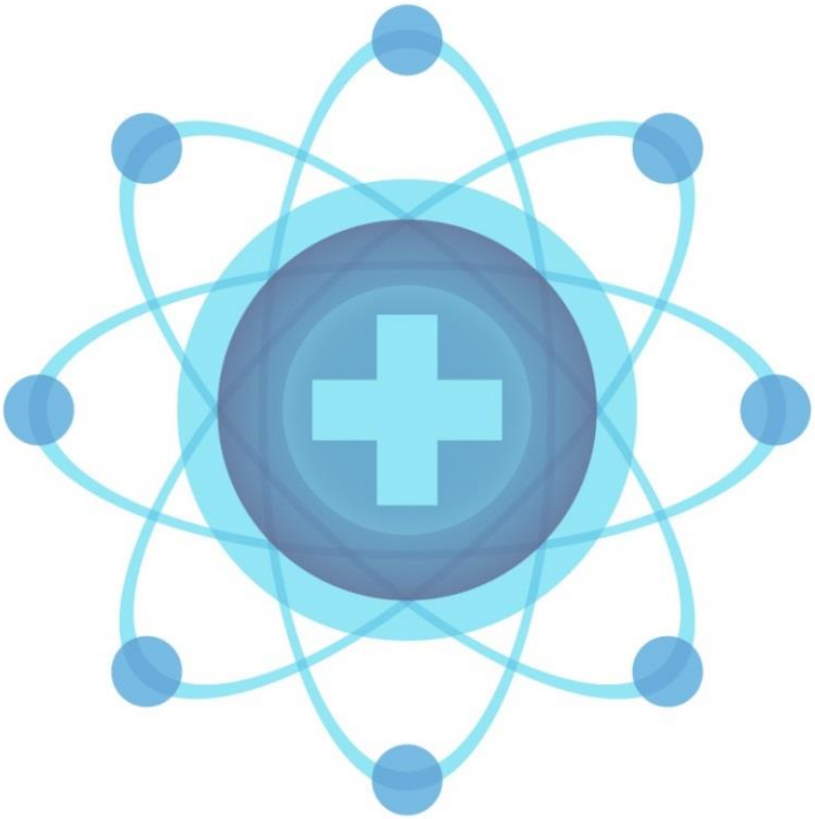

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THORACOSCOPIC PLASTY OF THE DIAPHRAGM IN NEWBORN

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Abstract: The article analyzes the treatment results of 14 newborns with false diaphragmatic hernias. In 9 cases, the malformation was established antenatally. All patients underwent thoracoscopic surgery, the average operation time was 75 minutes. There were no intraoperative complications or blood loss. The result was assessed within 3 to 6 months after the operation. All patients achieved excellent immediate and long-term functional and cosmetic results.
Keywords: newborns, congenital diaphragmatic hernia, endosurgery.

Relevance. According to various world neonatal centers, the frequency of congenital diaphragmatic hernia in newborns ranges from 1:2500 to 1:4000 cases. (1,2,3,4) Approximately in 90% of cases, the movement of organs from the abdominal cavity to the chest occurs through the posterior slit-like defect on the left. Pulmonary hypoplasia and hypertension are the main causes of patients' death with diaphragmatic hernia. About 36% of children with congenital diaphragmatic hernia die after birth from respiratory failure, despite resuscitation (1,2, 3, 4). Over the past 10 years, it has been possible to significantly improve the results of the treatment of congenital diaphragmatic hernia. This has become possible thanks to the introduction of new anesthetic, resuscitation and surgical strategies. Surgical treatment of congenital diaphragmatic hernia has been underwent significant changes, especially in the last decade. Standard suturing operations for the correction of congenital posterolateral defects of the diaphragm are traditionally performed using laparotomy. The introduction of endosurgical interventions in pediatric surgery attracts a considerable interest to many scientists in various countries. Every year the number of publications devoted to this section of surgery increases. One of the topical issues of modern pediatric endosurgery is the correction of diaphragmatic hernias in children (1,5,10,11).

Indications for endoscopic operations in case of diaphragmatic hernias are intensively expanding largely due to better visualization of the organs of the chest cavity during surgery, as well as all previous good functional and cosmetic results, a more favorable course of the early postoperative period and rapid rehabilitation of patients after surgical interventions. Endoscopic surgery in a group of newborns is a

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difficult task for surgeons and anesthetists due to the fact that the severity of respiratory and cardiovascular disorders plays a decisive role in these children (4,7,8,9).

Thus, the surgical treatment of diaphragmatic hernia, especially in newborns, remains a difficult problem in pediatric surgery.

Purpose of the study: identify ways to improve the surgical treatment results of congenital diaphragmatic hernia in newborns.

Materials and Methods: This paper presents the treatment results of 14 newborns with congenital diaphragmatic hernia for the period 2017-2021 according to the data of the Republican Educational, Medical and Methodological Center for Neonatal Surgery at the Republican Perinatal Center. 14 patients have been operated on endoscopically in total by now. In 9 cases, the defect was established in the antenatal period. Upon admission, all children underwent the following research methods: plain radiography of the chest and abdominal cavity, passage of the gastrointestinal tract, complex ultrasound examination (ultrasound) of the chest and abdominal cavity, neurosonography (NSG), echocardiography (EchoCG). In most cases, these research methods were sufficient for setting diagnosis. Preoperative assessment was carried out for 3 days using high-frequency ventilation of the lungs and was aimed at combating pulmonary hypertension and developing persistent fetal blood flow. Surgical intervention was performed under standard endotracheal anesthesia using a 4K endovideo complex and a set of KarlStorz instruments in the position on the right side. A roller was placed under the thoracic spine.

Operation technique:

When the diaphragm has been repaired, 3 troacars with a diameter of 3.3 mm were used for video optics and manipulators. Troacars were placed in the 4th intercostal space along the posterior axillary line and in the 6th intercostal space along the anterior axillary and scapular lines. To prevent hypercapnia and minimal hemodynamic disturbances during thoracoscopic surgery in the pleural cavity, low CO2 pressure (5 mm Hg) with a flow rate of 1 l/min was used. Primary entry into the left pleural cavity was performed by thoracocentesis with a 3.3 mm troacar in the 4th intercostal space along the posterior axillary line. In the absence of deterioration in the main parameters of monitoring, surgical intervention was continued. After carbon dioxide insufflation and lung collapse, the pleural cavity was examined (Fig. 1). Troacars for manipulators were introduced. Under the influence of positive CO2 pressure, with the help of manipulators, intestinal loops and parenchymal organs were immersed into the abdominal cavity. The defect of the dome of the diaphragm, its size, and the presence of a parietal muscle ridge were assessed (Fig. 2). The defect was sutured with separate interrupted sutures (Prolene 4/0) with intracorporeal knot formation, the pleural cavity was drained through the troacar opening (Fig. 3).

In the time of postoperative period, the children were on prolonged artificial lung ventilation in the neonatal intensive care unit. Received sedation and muscle relaxants. The timing of the transition to spontaneous breathing and the start of

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enteral loading depended on the stabilization of the respiratory function and the restoration of the passage through the gastrointestinal tract and, as a rule, did not exceed 5 days after the operation.

Research results and discussion:

Thoracoscopic plastic repair was performed in 14 patients with false diaphragmatic hernias. All children were in the neonatal period, among them there were 6 girls. The average age at the time of surgery was 3 days. The average body weight of newborns was 3200 g. In all cases, the defect was left-sided and posterolateral (average dimensions -3.5 * 2.0 cm). The contents of the left pleural cavity in all newborns were loops of the small and large intestines, stomach and spleen. The average operation time was 75±10 minutes. No blood loss or intraoperative complications were noted. In three cases, due to technical difficulties of diaphragm plastic surgery, a conversion was performed and a thoracotomy was performed. The average period of artificial lung ventilation after surgery was 6.6 days, pleural drainage - 5.3 days. Enteral loading began on the 2-3rd day. Pain relief was not prescribed. The average duration of postoperative hospitalization was 20.5 bed-days. 3 (21%) children died in the postoperative period. The immediate causes of deaths were "major" or "life-threatening" concomitant defects, prematurity and respiratory distress syndrome, hypoplasia and hypertension of the lung. The children were examined after 3-4 months: all patients were developed according to age, the functional state of the diaphragm was satisfactory. In one case there was a recurrence at the 5th month of life. All patients received a good functional and cosmetic result.

With the development of endosurgery, the repair of false diaphragmatic hernias has become a safe procedure in infants and newborns. Thoracoscopy allows you to visualize the organs that have moved into the pleural cavity, and atraumatically set them into the abdominal cavity. The lowering of organs is greatly facilitated by the insufflation of carbon dioxide into the pleural cavity. The pressure in the pleural cavity (5 mm Hg) in the absolute majority of cases allows the lung to collapse and create optimal conditions for manipulations on the diaphragm. It is this pressure that is defined as safe for newborns - it does not cause hemodynamic disturbances. Since unhindered access to the diaphragm is possible. After assessing the defect of the diaphragm, the latter is sutured with non-absorbable threads Prolene 4/0. Due to the absence of damage to the peritoneum, there is no postoperative paresis of the gastrointestinal tract and the development of adhesive disease. A short period of prolonged artificial lung ventilation (6.6 days) is due to the absence of an operative chest injury, postoperative pain syndrome, and violations of the biomechanics of respiration.

Thus, endoscopic correction of congenital diaphragmatic hernia in newborns is a promising, low-traumatic and effective intervention that allows a smooth postoperative period and a reduction in pain. This metho of congenital diaphragmatic hernia correction in newborns helps to reduce the number of complications in the form of adhesive intestinal obstruction, reduce bed days and the duration of the operation itself.

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Conclusions

1. Introduced into clinical practice, thoracoscopic plastic repair of defect in false congenital diaphragmatic hernia is a fairly safe procedure in newborns.

2. Thus, the results of diaphragmatic hernia treatment in newborns depend on timely diagnosis, adequate preoperative preparation and the choice of optimal methods of surgical correction.

3. The outcome of such interventions depends on the experience of doctors involved in the treatment of this extremely severe category of patients, as well as the development of neonatal anesthesiology and resuscitation service in each particular medical institution.

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