

SURGICAL TREATMENT OF THE ACHALASIA IN CHILDREN. SINGLE CENTER EXPERIENCE

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ABSTRACT

Purpose: Achalasia of the esophagus is a rare disorder in children; its symptom can mimic common childhood illnesses. In this study, the tactics of managing children with the corresponding pathology and evaluating the effectiveness of ongoing surgical treatment at the Filatov Children Hospital are considered.

Materials: From 1991 to 2016, in the Filatov Children Hospital was treated 39 patients with achalasia. Since 2011, all patients (27 cases) have undergone laparoscopic Heller cardiomyotomy with Dor fundoplication. The average age was 9.9 (4-15) years. The most frequent symptoms were vomiting (81%) and dysphagia (70%). Weight loss was observed in 48.1% of patients and chronic cough in 25%.

Results: All children underwent laparoscopic Heller cardiomyotomy with Dor fundoplication. Intraoperative complication - damage to the mucosa of the esophagus occurred during cardiomyotomy in 2 cases (7.4%), which were cured during the laparoscopic procedure. There were no open procedures. Six (22.2%) required repeated intervention: pneumatic dilations (n = 2), balloon dilatation (n = 2) and re-surgery (n = 2).

Conclusion: In our study, laparoscopic Heller cardiomyotomy in the case of achalasia of the esophagus is effective in 77.8% of children. We recommend this operation with Dor fundoplication, and believe that it is the operation of choice in the treatment of achalasia in children.

Key words: *Achalasia*; cardiomyotomy; fundoplication; complication

INTRODUCTION

Idiopathic achalasia is a rare primary disorder of esophageal motility with a morbidity rate of 1 per 100,000 people. Achalasia is characterized by a lack of peristalsis of the esophagus of the body and a violation of relaxation of the lower esophageal sphincter (LES) due to the progressive destruction and degeneration of neurons in the muscle plexus. Unfortunately, the cause of neuronal degeneration is still unknown [3]. The aperistals and the dislaxation of LES subsequently lead to the retention of food and saliva in the esophagus, leading to typical symptoms of achalasia, namely, dysphagia, chest pain, regurgitation of undigested food, and weight loss.

Traditionally, the most commonly used treatment options are endoscopic pneumodilation and Heller's laparoscopic myotomy. Although pneumodilation is characterized by relapses and the need for re-treatment, Heller's myotomy is considered to be a more effective therapy for a long time. However, a small proportion of patients suffer from persistent or recurring symptoms after surgery. This study is aimed at assessing the effectiveness of Geller's car-

diomyotomy with Dor fundoplication as a treatment for patients with achalasia.

MATERIALS AND METHODS

In the period from 1991 to 2016, 39 patients with achalasia were treated in the N. Filatov Children's Hospital. Since 2011, all patients (27 cases) have undergone laparoscopic cardiomyotomy according to Geller with fundoplication according to the Dor. The average age was 9.9 (4-15) years. The average body mass index (BMI) is 16.9 kg/m²; with a minimum value of 11.4 kg/m², with a maximum value of 30.4 kg/m². Table 1 presents the clinical manifestations of the disease in our patients:

As can be seen from the table, the leading manifestations of the disease were vomiting and dysphagia in eating, which were present in almost all children with esophagus achalasia. In the overwhelming majority of observations (74%), children and parents noted the need to take a sip of water while eating. The lag in physical development and weight loss, which is the result of violations of nutritional status, was present in all children, but the degree of its severity was not the same. In 7 cases, there were re-

spiratory manifestations of the disease in the form of a cough arising at night as a result of chronic regurgitation.

All patients underwent a comprehensive examination, including a general clinical examination, radiography of the abdominal cavity organs, fluoroscopy of the esophagus with contrast material, esophagus fibroscopy, and ultrasound examination of the abdominal cavity organs and, in some cases, computed tomography.

Table 1. Clinical manifestations of the disease

Clinical symptoms	Number of patients	%
Vomiting	22	81,5
Disphagia	19	70
Need to take a sip of water while eating	20	74
Pain on swallowing	8	30
Grade 3 hypotrophy	2	7
Grade 2 hypotrophy	7	26
Grade 1 hypotrophy	4	15
Night Cough	7	25

A characteristic radiographic evidence of achalasia of the esophagus is the absence of a gastric gas bubble in the survey radiography of the abdominal cavity (fig. 1). The leading diagnostic method is fluoroscopy of the esophagus with contrast material, which we carry out with barium sulfate, in an upright position. Depending on the age, the volume of the low-density barium suspension is between 50 and 200 ml. The study reveals a more or less pronounced expansion of the esophagus, a delay in the barium suspension above the cardia, in some cases a prolonged, and characteristic narrowing of the cardia in the form of a gradually tapering outline – «beak bird» (fig. 2).

The first portion of the contrast medium enters the stomach in a thin stream, and then the contrast medium enters the stomach after a delay. A significant expansion of the esophagus, as a rule, is not detected in children [2].

Esophagofibroscopy reveals the expansion of the esophagus, esophagitis. With a slight increase in the esophagus, its pronounced transverse folding, an abundance of mucus, and the remains of food eaten the day before are found. Cardia has the shape of an outlet or funnel. With a significant expansion of the esophagus and its deformation, it is sometimes difficult to find a cardia, but it is freely passable for an esophagoscope.



Fig. 1. The survey radiography of the abdominal cavity.



Fig. 2. X-ray examination of the esophagus with barium sulfate.

Ultrasound diagnostics (fig. 3) and computed tomography (fig. 4) are performed in order to exclude volumetric formations of the thoracic and abdominal cavities, which can lead to violation of the esophageal patency.

All children underwent laparoscopic cardio-myotomy for Geller with gastropexy.

Technique of operation: the patient is lying on his back under general anesthesia, and the surgeon stands between the patient's legs. Pneumoperitoneum is maintained at a pressure of 10-14 mm Hg. Five trocars are introduced into the abdominal cavity (fig. 5). In this case, depending on the age and weight of the patient, we use trocar with a diameter of 3, 3.5 and 5 mm.

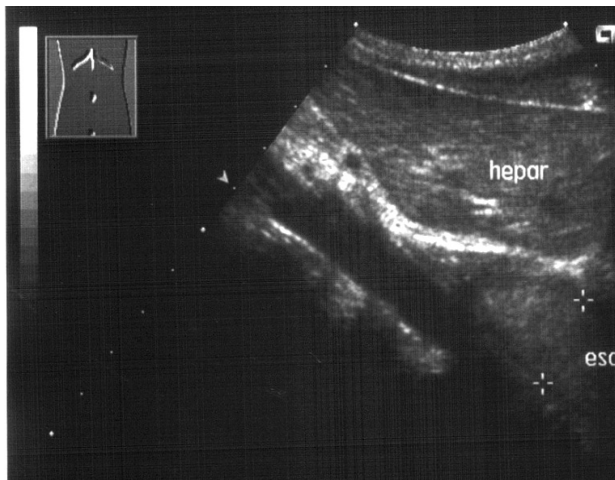


Fig. 3. Ultrasonic picture of achalasia of the esophagus

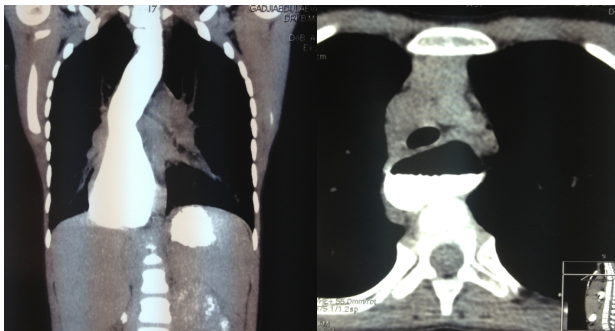


Fig. 4. Computer tomography of achalasia of the esophagus.

The first trocar introduced method of open laparoscopy through the umbilicus. Through this trocar into the abdominal cavity insufflated CO₂ (pressure 10-14 mm Hg). In the same trocar, we introduce a telescope with an angular optics of 30° (4-5 mm). After superimposition of carboxypeperitoneum and revision of the abdominal cavity, we introduce four additional trocar for endoinstrument, with a diameter of 3 or 3.5 mm. After examining the abdominal cavity, we lower the stomach and abdominal section of the esophagus into the abdominal cavity. We perform a partial mobilization of the lower part of the stomach to the left of the esophagus. Further,

we dissect the peritoneum above the esophagus by means of mono- or bipolar coagulation and we mobilize the abdominal esophagus.

After mobilization of the stomach and abdominal esophagus, it is necessary to note the myotomy line by a hook of monopolar coagulation. After this, we conduct an out-of-plane cardiomyotomy with simultaneous traction in the transverse direction by two instruments. The myotomy line should be formed approximately 4 cm above and 2 cm below the esophageal-gastric junction. The mucous membrane of the esophagus is excised on the 1/2 circumference of the esophagus. Then we pass to gastropexy. The lower part of the stomach is attached alternately to both edges of the cutting line with separate nodal seams (Ethibond 3/0).

Recently, in order to eliminate the inconsistency of the joints and eliminate tension in the gastropexia region, we perform mobilization of the stomach bottom with the intersection of the short arteries of the stomach.

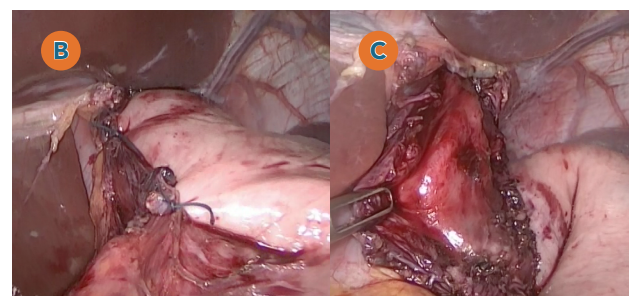
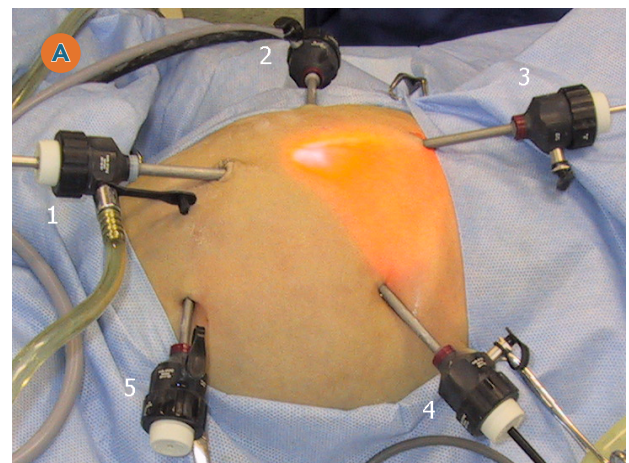


Fig. 5. A - Laparoscopy cardiomyotomy (location of trocars): 1 - trocar is installed through the navel (telescope), 2 - trocar in the right hypochondrium, 3 - trocar under the xiphoid process, 4 - trocar in the left hypochondrium, 5 - trocar in the left iliac region. B - Laparoscopic cardiomyotomy, gastropexy (endophotography.)

RESULTS

All patients are discharged home in a satisfactory condition. Cases of conversion was not. The average operation time is 75 minutes. The average stay in the hospital was 6 days. The average postop-

erative day for which they started to drink - 1, take food - 2. The intraoperative complication - damage to the mucous membrane of the esophagus occurred during myotomy in 2 cases (7.4%). Defect of the mucosa is sewn by separate sutures (Ethibond 3/0). Sealing of the seams of the esophagus mucosa after suturing is verified by injecting air through the gastric tube.

Six children (22.2%) required repeated intervention: pneumodilatation (n = 2), balloon dilatation (n = 2) and repeated surgery (n = 2).

Cases of relapse, apparently, are associated with insufficient mobilization of the muscular layer in cardiomyotomy, the presence of a cicatricial process in the field of cardia, and deformation of the stomach after surgery.

DISCUSSION

Based on a comparative analysis of the long-term results, 431 cardiodilations and 468 esophago-cardiomyotomies at the Mayo clinic showed excellent and good results in 65% and 85% of patients, respectively. Unsatisfactory results after conservative treatment were observed 3 times more often, 19% and 6%, respectively [17]. Some authors believe that cardiodilation justifies itself in 50% of cases [6].

The main drawback of cardiomyotomy is the occurrence of gastroesophageal reflux. In the long term after the operation of Geller, the incidence of gastroesophageal reflux is 52%, reflux esophagitis 17%, hernia of the esophageal aperture 9%. [11]. In patients with high acidity of gastric juice, this leads to reflux esophagitis and the formation of esophageal stenosis. All this served as an excuse for supplementing Geller's operation with antireflux operations such as Nissen's fundoplication [4], Toupet [21], Belsey [12], Dor [13]. Some authors, in the case of achalasia, prefer Dor fundoplication in laparoscopic Geller's cardiomyotomy [16, 18, 20]. While other authors prefer fundoplication by Toupet. So, A. Kilic and co-authors in 93% of cases performed fundoplication, of which 75% by Toupet, 16% by Dor and 1% by Belsey. C. Smith gives a series of observations of 209 patients who performed gastric dysfunction in Toupet in 86.6% of cases, and in 12% of cases according to the Dor and, correspondingly, 1.4% of operations without fundoplication [10, 19].

In order to reduce the number of repeated interventions due to the recurrence of achalasia of the esophagus after laparoscopic cardiomyotomy, Jafri M. and co-authors suggest performing intraoperative manometry to determine the adequacy of myotomy [9]. For the first time, data on the use of intraoperative manometry belong to Hill L., who published the results of transthoracic cardiomyotomy. In 94% of cases, a good result was obtained [7, 8]. In the largest series of observations (139 patients) of laparoscopic cardiomyotomy using intraoperative manometry, the case of relapse of pressure in the NPS was observed in 1 patient and symptoms of

dysphagia in 7% of cases [5]. Interesting data lead C. Smith and co-authors, who analyzed the results of treatment of 209 patients with esophagus achalasia. In the first group (154 patients), various conservative methods of treatment were used before cardiomyotomy: balloon cardiomyelitis, injections of botulinum toxin, and subsequently both methods. In this group, the level of mucosal perforations during cardiomyotomy was 9.7%, whereas in patients who did not use conservative methods of treatment (the second group), this indicator was 3.6%. Late post-operative complications in the form of severe dysphagia and complications from the lungs in the first group occurred twice as often. Also, the authors cite data on insufficient myotomy, which is manifested by severe symptoms of the disease after surgery. In the first group, additional procedures were required in 19.5% of cases, including repeated myotomy and esophagology, and in the second group in 10.1% of cases. Given these data, the authors recommend that conservative treatment methods should not be performed for those patients who are scheduled for cardiomyotomy [19].

Endoscopic treatments for achalasia - the apparent absence of POEM in the pediatric population. It has the combined advantages of endoscopic procedure with long-term effectiveness of surgical myotomy. Until 2015, a study conducted by Caldaro et al. Was conducted only in adults with proven safety and efficacy [1]. The findings showed that he had a shorter surgery time, lower complication rates, faster feeding time, a longer myotomy, and a faster discharge [8]. A single-centered experience of 26 patients with an age interval of 6 - 17 years demonstrated successful treatment for 2 years C 20% development of reflux [2]. Given recent acquaintance with children, there may be a need to move to standard treatment, when even more experienced endoscopists will be available and trained to provide comparable or improved results for achalasia [19].

CONCLUSION

As the literature data and own observations show, surgical treatment of esophageal achalasia with a good functional result is possible with the use of minimally invasive methods. In our opinion, and in the opinion of a number of authors, laparoscopic cardiomyotomy with fundoplication can be considered an operation of choice for achalasia of the esophagus, since they possess all the advantages of minimally invasive interventions and have the same results as in open operations. Laparoscopic cardiomyotomy according to Geller during achalasia is effective in 77.8% of children. We are considering a laparoscopic cardiomyotomy according to Geller with Dor fundoplication - the operation of choice in the treatment of achalasia in children.

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