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Acute gastric dilatation in children

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Acute gastric dilatation is a rare surgical condition in children, which often results from blunt abdominal trauma. This condition is characterized by the gut-brain connection disorder or gastric muscular layer damage, which results in atony. Gradual gastric stretching with fluid contents and gases in the end leads to the development of various types of intestinal obstruction. When conservative measures are not sufficient (in rare cases), it is reasonable to resort to operative intervention. Several cases of such a pathology have been published around the world. This condition has been observed not only at the blunt abdominal trauma, but also at lesions of central and peripheral nervous systems and in patients with anorexia nervosa and bulimia in the event of excessive food consumption. The article presents a clinical case study and a follow-up analysis of a child with posttraumatic acute gastric dilatation. The authors describe clinical manifestations, pathogenesis and diagnostic algorithm, which allowed establishing this rare diagnosis. Along with the conventional drugs and intensive care measures, the treatment involved a complex of mini-invasive endosurgical and endoscopic manipulations, including laparoscopic jejunostomy, which was performed in order to provide long-term enteral feeding. The clinical case study demonstrated that the use of diagnostic laparoscopy helps to establish nature of the gastric damage correctly and formulate the following optimal treatment tactics on the basis of the obtained data.
Keywords: *acute gastric dilatation, laparoscopic jejunostomy.*

CASE STUDY

Girl A., 13 years of age, was admitted to the inpatient hospital with complaints of abdominal pains, nausea and vomituration. Anamnesis states that after having had an abundant food intake, the girl was hit in the stomach by an age peer (with head) during the game. Several minutes after the hit the girl felt dilatation and gradually increasing epigastric pain. Later, the girl experienced false vomituration several times. 12 hours after the symptoms occurred the girl was admitted to the inpatient hospital.

The child's condition at admission to the inpatient hospital was moderate. Body temperature – 36.7 ^{o}C. Smooth skin and visible mucosa. Examination revealed thoracic scoliosis. Respiratory rate – 20 movements per minute; diminished breath sounds in lower pulmonary segments on auscultation. Heart rate – 100 bpm, arterial pressure – 110/60 mm Hg. Distorted (due to epigastric protrusion), soft, painful (in the upper segment, where soft elastic space-occupying lesion is palpable) stomach. Tympanites are identified on percussion, splashing sound – on auscultation. Negative peritoneal irritation symptoms. Triple non-abundant emesis with stagnant acidic gastric contents with indigested food particles was observed during the examination.

Clinical blood analysis: leukocytes – 18.3 x 10^9/l, hemoglobin – 139 g/l. Unremarkable urine analysis.

Ultrasound examination helped to visualize a hyperinflated stomach with heterogenous contents (fluid and gas) in the upper abdominal cavity segment. Abdominal cavity radiography (pic. 1) helped to identify scoliotic spinal deformity, fluid in the stomach under the left cupola of the diaphragm and a small amount of fluid in the duodenal projection on the right.

The child underwent contrast-enhanced computed tomography of the abdominal cavity (pic. 2): a distended, huge stomach (272 x 203 x 81 mm) is visualized on a series of images. Fluid is observed in the distended stomach.

The child was planted with a gastric tube; a large amount of stagnant contents with food particles and blood streaks was removed. After that, the child underwent gastroscopy, which helped to visually assess condition of the gastric mucosa (pic. 3): edematous, dark-cherry mucosa with multiple draining hemorrhages; gastric folds are feebly pronounced. This pattern was classified as hemorrhagic gastritis in the setting of considerable long-term gastric dilatation and trophic disturbance.

Due to unclear nature of gastric damage and impossibility to rule out other concurrent abdominal organ injuries, we decided to perform diagnostic laparoscopy. Laparoscopy was performed under endotracheal anesthesia. We observed a moderate amount of serosanguineous exudate in the lesser pelvis. We revealed abrupt gastric dilatation and hematoma of the anterior wall of the gastric corpus (pic. 4). We did not observe injuries of any other organs. On the basis of the obtained data, we decided to continue conservative treatment of the patient. Operative intervention completed with abdominal cavity sanitation and drainage placement in the lesser pelvis.

The child remained at the resuscitation unit, where she underwent complex conservative treatment, the crucial component of which consisted in continuous aspiration of gastric contents via the tube. It ought to be mentioned that the amount of drainage via the gastric tube was large for a considerable period of time (pic. 5). The child underwent infusion, antibacterial, antiulcer, antacid and hemostatic therapy and total parenteral nutrition.

The child underwent the second and the third laparoscopies after 7 and 10 days at the inpatient hospital. Gastric mucosal lesion looked like hemorrhagic gastritis with multiple ulcers at different stages of cicatrization. Anterior wall of the stomach was covered with thick bile-dyed fibrin. We also observed an esophageal condition in the form of fibrinous reflux esophagitis.

On the basis of the obtained data, we concluded that *per os* nutrition would have to be postponed. We attempted to plant enteral feeding tube in the process of examination, though without any considerable success, as the vomiturition would displace the tube.

Thus, due to the need in adequate nutrition and infeasibility of tube feeding, indications for another operation – laparoscopic jejunostomy – were set forth. Relaparoscopy was performed on this basis. Revision revealed that the upper segment of the anterior gastric corpus surface and gastric fundus are “soldered” to the anterior abdominal wall; gastric wall was also fused with the left kidney lobe; the unfused visible part of the stomach was unaltered. Suspended jejunal tube was placed 25 cm off the ligament of Treitz; the jejunum was additionally fixed to the anterior abdominal wall over a distance of 10 cm in distal direction in order to avoid twisting and development of ileus.

Enteral feeding with Nutrini was launched on the day of the operation. The feeding volume was gradually increased from 300 to 1,500 ml per day. We observed clear positive dynamics of the patient’s condition in the setting of the performed treatment. Nasogastric tube was removed after 1 week and the child was transferred from the resuscitation unit to the general surgery unit. Enteral *per os* feeding was launched after 1 month at the inpatient hospital: first, the girl started receiving a fermented milk drink, then – baby meat puree. Control gastroscopy 1 week after demonstrated the following pattern: gastric mucosa was moderately hyperemic, edematous and featured multiple cicatrices; the anterior gastric wall still had a small mucosal defect with superficial fibrin overlay. Cicatrical gastric corpus deformity (pic. 6) was observed on the

corpus-antrum border in the form of concentric diminution. Esophageal mucosa was slightly hyperemic. The jejunal tube was removed 1 more week later; jejunostomy closed up completely within two days. The girl was discharged from the hospital in satisfactory condition.
Catamnesis duration – 1 year. The child has not had any active complaints. The girl observed a sparing diet and underwent course antacid and antiulcer therapy. Control gastroscopy: normally sized stomach, cicatrical concentric deformity on the gastric corpus-antrum border not obstructing food passage. Condition of the mucosa – consistent with the endoscopic pattern of reflux gastritis. Contrast-enhanced radiography did not reveal any obstructions along the contrast agent passage via the gastrointestinal tract.

DIAGNOSIS AND DISCUSSION

On the basis of clinical and anamnestic data and results of instrumental analyses, we diagnosed acute gastric dilatation caused by blunt abdominal trauma.
Acute gastric dilatation is a specific form of gastrointestinal tract obstruction caused by acute gastric atony [1]. According to the accessible literature, this condition is observed in children in the following cases: after spine, abdominal or thoracic organ surgery, in the event of blunt abdominal trauma, central or peripheral nervous system conditions and due to excessive food consumption in persons with anorexia nervosa and bulimia.
Clinical pattern of acute gastric dilatation is characterized by such symptoms as the feeling of spreading, epigastric pain, emesis or vomituration, inflation of the upper abdominal segments, tympanites on percussion, splashing sound in epigastrium and signs of exsiccosis. Acute gastric dilatation diagnosis is established on the basis of patient's complaints and examination data and confirmed by abdominal cavity radiography, including contrast-enhanced radiography.
Disease pathogenesis may be described as follows: the first stage is characterized by nervous regulation disturbance or direct damage of the gastric muscular layer; this results in acute gastric atony [2]. Malabsorption in the presence of preserved high secretory activity of the mucosa results in gradual gastric stretching with fluid contents and gases. Enlarged stomach pushes small intestinal loops downwards and results in stretching of the mesentery; this leads to the development of arteriomesenteric intestinal obstruction and obstruction of mesenteric vessels. Gastric wall stretching and gastric contents pressure result in disturbed gastric wall's blood supply, which may lead to necrosis of the wall and rupture of the stomach.
Acute gastric dilatation is a rare pathology of abdominal cavity organs in children; there are few publications thereon. Kasenally et al. described acute gastric dilatation in two children with blunt abdominal traumas suffered as a result of road accidents [3]. Franken et al. and Saul et al. published 5 clinical cases of gastric dilatation in the children with anorexia nervosa malnourished for a long period of time after intake of a large amount of food each [4, 5]. Wani et al. described a 13-year-old girl with acute gastric dilatation caused by blunt abdominal trauma [6]. The main therapeutic measure in all of the aforementioned cases consisted in placement of a nasogastric tube with subsequent aspiration of gastric contents for one-two days combined with infusion therapy.
Analysis of the aforementioned studies leads us to the conclusion that the situations when operative intervention is required are rare; conventional measures usually suffice. There are only singular examples of such cases in the world literature. Thus, Qin et al. [7] published case study of a 4-year-old girl admitted to the inpatient hospital 4 days after the disease onset. Laparotomy on the greater curvature of the stomach revealed a necrotic zone with perforation in the center. Gastric resection, gastrostomy and abdominal cavity drainage were performed. These measures saved the girl's life.

CONCLUSION

Thus, given the data available in the published sources, we may conclude that such a pathological condition as acute gastric dilatation in children is rare. The main groups of patients are children with blunt abdominal trauma, anorexia nervosa or bulimia. All children with acute gastric dilatation must undergo placement of a nasogastric tube and subsequent aspiration of gastric contents as soon after the disease onset as possible; these measures ought to be accompanied by infusion therapy and parenteral nutrition. In most cases, these measures are performed for 1-2 days and result in the patient's condition improvement; they also render enteral feeding possible. Diagnostic laparoscopy is indicated if acute surgical pathology of other abdominal cavity organs cannot be ruled out or when gastric wall intactness is in question. Our clinical case study demonstrated that diagnostic laparoscopy helps to accurately identify the nature of gastric damage and determine further treatment tactics on the basis of the obtained data. A jejunal tube planted laparoscopically may be used in the event of severe damage of the gastric wall, which renders enteral feeding of the child impossible for a long period of time, or when food cannot be administered via a nasojejunal tube.

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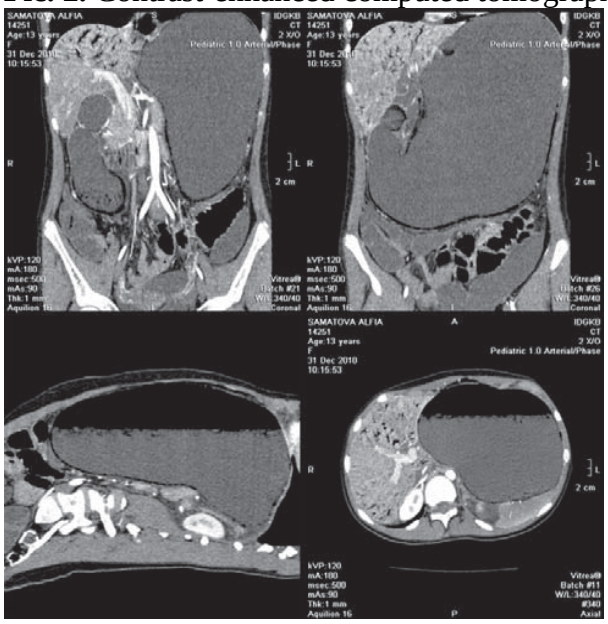
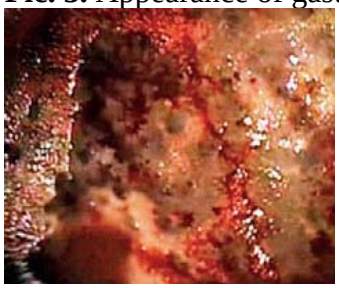
Pic. 1. Survey abdominal cavity radiogram

Pic. 2. Contrast-enhanced computed tomography

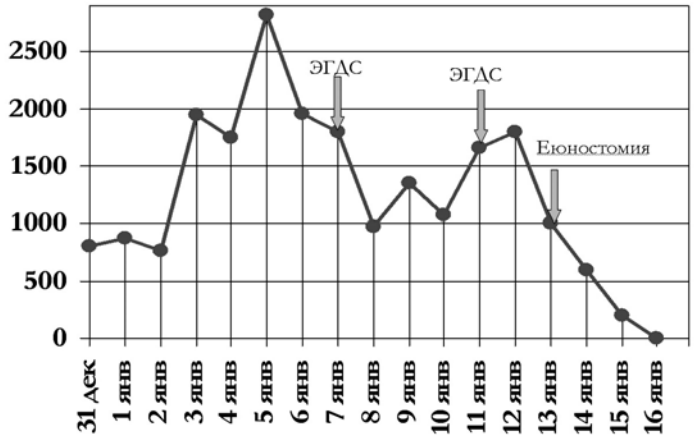


Pic. 3. Appearance of gastric mucosa (gastroscopy)



Pic. 4. Laparoscopy: dilated stomach with large hematoma on its anterior wall

Pic. 5. Amount of gastric probe drainage per day (ml)



ЭГДС	*EGD*
Еюностомия	*Jejunostomy*
дек	*December*
янв	*January*

Pic. 6. Control gastroscopy: concentric gastric deformity on the corpus-antrum border without obstruction