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FEATURE ULTRASONIC DIAGNOSTICS IN INTESTINAL MALROTATION (literature review).

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Abstract:

Clinical signs in some disorders often lead to a long diagnostic search. The recognition of knowledge in the fie ld of pathology can provide a key to the interpretation of instrumental research methods. The reviews present modern methods o f visualization of the abdominal cavity with intestinal malrotation. It is shown that echographic visualization is a sufficient basis fo r determining operational tactics.

Keywords: Malrotation of the intestine, visualization, echodoplerography, children

One of the reasons for high intestinal obstruction is impaired rotation and fixation of the midgut. Disruption of the process of intrauterine rotation of the midgut, development and fixation of its parts forms a group of defects and is called intestinal malrotation in the literature [19]. Malrotation and volvulus were first described in the 19th century by the Bohemian anatomist Václav Treitz; the study was continued by William Ladd, who was the first to successfully operate on a patient with volvulus in the 20th century [23]. The embryology of intestinal malrotation was described by Mall in 1898 [8]. In 1932, a landmark article was published describing the surgical treatment of malrotation by William Edward Ladd (W.E.LHdd), the founder and head of the first department of pediatric surgery at Harvard Medical School.In a broad sense, "malrotation" refers to a spectrum of abnormal rotation of the duodenum and cecum, as well as simultaneous rotation of both components, around the axis of the superior mesenteric artery (SMA) with variable fixation of the midgut and hindgut to the retroperitoneum [13] . The most significant abnormal rotation and fixation of the intestine can be associated with volvulus of the midgut around the axis of the SMA, thereby preventing lympho-, venous outflow and ultimately disrupting the arterial circulation in the midgut, which can lead to massive intestinal infarction and resection, short bowel syndrome and death [13].

One of the components of MC is Ladd syndrome (LS). Ladd syndrome (LS) is the most common form of high intestinal obstruction (HIO) (11.3%) and intestinal malrotation (37.7%) in newborns, manifested by symptoms of intestinal obstruction and peritonitis.

Diagnosis due to the nonspecificity of the symptoms of the disease is very difficult. The clinical picture is dominated by persistent vomiting and periodic abdominal pain, malnutrition. All children with these, as well as other nonspecific, but recurrent gastroenterological manifestations, need to undergo targeted ultrasound with color circulation of the mesenteric vessels and a radiocontrast CT study. The most informative and highly sensitive method in diagnosing malrotation is the ultrasound diagnostic method with Dopplerography of mesenteric vessels. The variety of possible variants of intestinal rotation and fixation disorders undoubtedly complicates the diagnosis [9]. At the same time, the blurring of clinical signs in some disorders of midgut rotation often leads to a lengthy diagnostic search [2]. It is in such situations that a careful collection of anamnesis and understanding of all clinical symptoms through the prism of knowledge of the essence of pathology can provide the key to the interpretation of instrumental research methods. In the postnatal period, most children with vomiting undergo abdominal radiography, which is not specific for the diagnosis of rotation disorders. Proximal obstruction caused by bands of Ladd, incomplete volvulus, or associated atresia or duodenal compression results in a double bladder and air deficiency in the distal bowel. In some cases, children with intestinal rotation disorders, including poor motility during volvulus, may initially have normal bowel gas patterns.

The current gold standard for diagnosing rotational disorders is upper gastrointestinal radiography to assess the position of the duodenum and

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jejunum, which should be located to the left of the vertebral body at the level of the inferior border of the duodenal bulb on the anteroposterior view. In the presence of splenomegaly, tumors of the kidney or retroperitoneum, excessive expansion of the stomach, obstruction of the small intestine and scoliosis, the intestinal complex consisting of the duodenum and jejunum can be found in the middle or lower abdomen.

Traditional diagnosis is based on an assessment of the child's clinical condition and X-ray data. At the same time, survey radiography is not very informative: a relatively large gas bubble in the stomach and reduced gas filling of the underlying sections of the intestine are determined, that is, it is not possible to reliably diagnose the disease using survey radiography. Levels typical for low intestinal obstruction are not detected; the typical X-ray picture for duodenal atresia in the form of 2 levels and the absence of gas filling in the underlying sections of the intestine is also not determined. X-ray contrast examination is much more informative [14,19,26,28,34].

With oral contrast, stagnation of contents in the dilated stomach and megaduodenum are determined. Evacuation of the contrast agent to the underlying parts of the intestine is sharply slowed down. In this case, sometimes the atypical location of the loops of the small intestine is clearly visible - they are located in the right half of the abdomen. The main diagnostic value is irrigography, which determines the high location of the dome of the cecum, which in fact is a pathognomonic radiological sign of this disease [1,3]. Thus, radiocontrast examination makes it possible to diagnose the high location of the dome of the cecum, dilatation of the duodenum, and slow evacuation of contents into the cecum. the underlying sections of the intestine and the atypical location of the loops of the small intestine, but the volvulus itself cannot be diagnosed radiographically.

A banal ultrasound examination (US), as a rule, is not very informative, since signs of dilatation of intestinal loops and the echographic sign of a pendulum characteristic of intestinal obstruction of other origins are not observed in this case. In a typical case, it attracts attention
only a decrease in gas filling of the intestinal loops, but this echosymptom is nonspecific and does not allow diagnosing the pathology. Despite the fact that the first foreign description of the echographic picture of volvulus is dated 1992, and the domestic one - 2002, the pathology remains little known to practicing doctors. Actually volvulus on ultrasound in infants was first described by J. Pracros. 1992, when color Doppler examination was used, which fundamentally improved the visualization of the vascular component of volvulus. The layered ring typical of a whirlpool with the vessels involved in it has its own figurative name in English literature: Whirlpool Sign (whirlpool sign), since it really resembles the funnel of a whirlpool, the center of which is a cross section SMA [11, 14, 18]. Inversion of the SMV and mesentery around the SMA occurs clockwise (clockwise whirlpool sign), which can be traced echographically by moving the sensor in the craniocaudal direction along the inversion . The reverse direction of volvulus is incidentally rare. In adult practice, volvulus can also be visualized on ultrasound, but CT is more often used, in which the frontal scan produces a picture almost identical to the echographic one [11, 12, 19, 21]Angiography is also used [12]. There are descriptions of antenatal midgut volvulus; the first description of a case of prenatal echographic diagnosis of volvulus belongs to S. Yoo Such observations are extremely rare, but most authors admit that intrauterine volvulus is not an obligately lethal complication, often leading to the development of necrosis of intestinal loops, meconium peritonitis, formation of small intestinal atresia. Polyhydramnios is typical in late pregnancy. In cases of antenatal diagnosis of volvulus, the operation is performed in the first hours after the birth of the child [16, 18, 22]. The diagnostic value of sonographically detected volvulus is very high: sensitivity exceeds 90%, specificity and positive predictive value reach 100% Widespread
introduction into clinical practice of ultrasound studies (ultrasound) and computed tomography (CT) have improved the diagnosis of intestinal malrotation in children and adults, including antenatally [4, 5, 6, 8, 15]. However, in the literature there are no works analyzing individual clinical and morphological forms of rotation disorders and fixation anomalies in children of different age groups. The literature presents an echoscopic picture of congenital volvulus, including during antenatal examination. For certain forms of malrotation, these methods are highly sensitive and specific [6]. Unfortunately, the use of this study is limited in emergency cases due to the lack of appropriate equipment in many hospitals. The experience of leading clinics proves the promise and high effectiveness of laparoscopy in the diagnosis and surgical correction of intestinal malrotation [8].

Thus, malrotation in children older than the neonatal period is a rare pathology. Diagnosis due to the nonspecificity of the symptoms of the disease is very difficult. The clinical picture is dominated by persistent vomiting and periodic abdominal pain, malnutrition. All children with these, as well as other nonspecific, but recurrent gastroenterological manifestations need to

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undergo targeted ultrasound with colorectal dosage of the mesenteric vessels and X-ray contrast examination of the gastrointestinal tract. The greatest information content and high sensitivity The method of ultrasound diagnostics with Dopplerography of mesenteric vessels is used in the diagnosis of malrotation. [7]. An echographic pathognomonic sign of Ledd syndrome is the detection of a vascular "ring" with a diameter of about 2 cm in newborns, which is formed by the superior mesenteric vein and its branches involved in the mesenteric volvulus. The vascular "ring" is located in the epigastric region to the right or left of the abdominal aorta and in the central part contains the superior mesenteric artery, around which the volvulus itself is formed. It is advisable to carry out scanning first with a vector (convex) and then with a linear sensor for clearer visualization of structures suspected of torsion. With the development of irreversible changes in the intestinal loops (late admission of the patient against the background of a tight volvulus), the typical echographic picture of volvulus in the form of a vascular "ring" is not detected; typically, there is a uniform moderate expansion of the intestinal loops and the absence of a vascular pattern in the intestinal wall and mesentery. The echographic picture of the "ring" during volvulus is somewhat reminiscent of the "target" symptom with intestinal intussusception. For differential diagnosis, a polypositional scan is necessary, in which the "target" symptom is transformed into a "layer pie" symptom, and the vascular "ring" disintegrates without a clear picture in the sagittal scan, but with a characteristic lack of visualization in a typical location of the trunk of the superior mesenteric vein. Atypical vascular anatomy of the epigastrium in an infant with regurgitation and vomiting syndrome, which does not allow echographic exclusion of midgut volvulus, should serve as an indication for a comprehensive X-ray contrast study.

If malrotation is suspected, irrigography is mandatory to identify the abnormal location of the cecum, however, given that in 20-40% of cases with malrotation the cecum is located in its usual place, an X-ray contrast study of the upper gastrointestinal tract is performed. Some foreign authors call this study the "gold standard" for suspected malrotation [23]. Other research methods in the case of intestinal malrotation can complement the diagnosis. Thus, with ultrasound, it is possible to establish volvulus of intestinal loops around the mesentery (the so-called "jacuzzi symptom").When performing a computed tomography scan, this sign is called the "whirlwind sign" or "whirlwind sign." However, midgut volvulus does not always accompany malrotation. Angiography may reveal a barberpole (spiral) symptom, characteristic of a tortuous course of the superior mesenteric artery and its branches or torsion with the superior mesenteric vein [3,9].

Conclusions:Thus, in case of uncomplicated malrotation or even if it is suspected, the examination should be comprehensive, including x-ray (survey images in two projections, irrigography, passage through the gastrointestinal tract), Doppler ultrasound and CT of the abdominal organs. If complications occur, the data from plain radiography of the abdominal organs and Doppler ultrasound of the intestines and mesenteric vessels are sufficient to establish indications for surgical intervention. Laparoscopic intervention is more reassuring both in terms of diagnosis and surgical correction.

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