DIAGNOSTIC SIGNIFICANCE OF ULTRASONIC SONOGRAPHY IN CHILDREN WITH APPENDICULAR PERITONITIS

The aim of the research is to study the possibilities of ultrasonic sonography in children with generalized purulent appendicular peritonitis (GPAP) complicated with intestinal paralysis (IP). This should help to assess motor activity of the intestine, as well as development of pathological process in a peritoneal cavity.

93 patients (children from 2 to 15 years) with appendicular peritonitis were tested. All patients were divided into 2 groups. The first group comprised of 45 patients with appendicular peritonitis with a complicated cut (1st- 2d stage) of intestines. The second group is 48 infants with GPAP and complicated IP (the main group).

The following echo graphical indexes were assessed: presence of liquid in peritoneal cavity and its localization, presence of intestinal peristalsis, diameter and thickness of intestines, accumulation of fluid and air in the intestinal lumen, and nature of chyme movement in intestines. Comparing preoperative indicators of ultrasound sonography with the results of intraoperative revision of the abdominal cavity revealed that in 91.2% cases sonographic data were similar to the intraoperative ones. Ultrasound sonography in post operative period allows recognizing not only pros of clinic evidence; it also contributes to early recognition of postoperative intra-abdominal complications (abscess of the abdominal cavity, commissural complications).

Keywords: Infantile appendicular peritonitis, ultrasound sonography.

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Introduction

Diffuse purulent appendicular peritonitis (DPAP) complicated with intestinal paralysis (IP) is one of the imperative problems in pediatric surgery. Diagnosis of DPAP, complicated by IP, and correct evaluation of its severity before operation at children is the basis for further treatment tactics and disease prognosis (Isaev, et. al., 2000; Pacceli F. et. al., 1996; Vas, 1994). Different methods are used for examination of purulent process dissemination and motor function of intestine at appendicular peritonitis (Bachev, 1980; Bushmelev et. al., 1997; Dronov et. al., 1999; Mihalskiy, 1997). Examinations that need the usage of foreign bodies (instruments, contrast and radioactive substances) could be used only before operation due to indications, but not after the first hours and days following operation; as they could cause serious complications themselves (Konovalov, 1996). Applying the CT Enterography and electroenterography along with intestinal peristaltic sounds also registers cardiac tones and lung rales (Maynugin et. al., 1988) that makes difficult an optimal diagnosis. This proves that diagnosis of appendicular peritonitis form and severity degree of intestinal paresis in the preoperative period still remains important.

Thus, using of ultrasound sonography (USS) of abdomen cavity in children with peritonitis for evaluation of pathologic process dissemination and intestinal paresis degree before and after operation has a big scientific and practical interest (Buyanov et. al., 1999; Timerbubulatov et. al., 2000).

The aim of our investigation was to study of USS in children with DPAP, complicated by IP, for consistent evaluation of intestinal motor activity, degree of pathologic process dissemination in abdomen cavity during dynamic control of treatment efficiency.
Materials and methods

93 patients aged 2 - 15 years (40 girls and 53 boys) hospitalized into surgical department with diagnosis “peritonitis” were under our observation in Samarkand affiliate of Republic Scientific Centre of Pediatric Surgery. Dynamic USS of abdomen cavity organs was conducted to verify intestine paresis intensity, abdomen cavity inflammatory process spread, definition of further surgical tactics and evaluation of conducted treatment at patients with DPAP complicated by IP. Motor-evacuatory function of intestine, inflammatory process dissemination in children with appendicular peritonitis in dynamics were studied, location and spread of spare liquid in abdomen cavity were evaluated. The study analyzed also presence of intestinal motility and its character, intestinal diameter and liquid, accumulation of fluid and gas in its lumen, dynamics of chyme in intestinal tube. Examinations were conducted without advance preparation of the patient, in his horizontal position on the back by equipment Aloka-500-SSD, Siemense Sowoline SI-450 with the usage of linear elements 3.5; 5.5; и 7.5 MGz, and using a dosage sensor compression to the abdominal wall.

Results and discussion

All observed patients were divided into two groups according to the results of primary surgical examination, clinical manifestations of intestinal paresis and conducted treatment approach. 45 patients with appendicular peritonitis, complicated by intestinal paresis of I-II stage (comparison group), were included into the first group. 48 children from 98 patients with DPAP, complicated by IP (basic group), made the second group. Both groups were identical by age that made comparative analysis easier. 96% of patients of the first group with appendicular peritonitis were hospitalized on the 1-4 day of the disease; all patients of the second group were hospitalized later, on the 3-10 day of the disease. Local appendicular peritonitis was diagnosed in 4 patients from the first group, 36 had diffuse appendicular peritonitis and other 5 patients from this group had generalized appendicular peritonitis. DPAP was diagnosed at all patients of the second group.

Patients of the first group (45 children of the comparison group) according to the method of paresis treatment were assigned into three subgroups. Patients of the first subgroup (24 patients) proceeded with evacuating stagnant stomach contents by nasogastral tube in pre- and postoperative period; they received also periodic stomach cleansing by 2% sodium hydrogen carbonate solution. Cleansing and hypertonic enema were also done as well as infusive disintoxication therapy, and potassium deficit correction. These all procedures conditioned paresis elimination. Children of the second subgroup (11 patients) were treated the same way as the first and additionally received proserin (neostigmine methylsulfate). The described methods did not alleviate paresis in patients of the third subgroup (10 patients), and they were treated by the long-lasting lidocaine peridural anesthesia.

48 children with DPAP, complicated by IP (second group), in the case of ineffective treatment and stimulation of motor-evacuative function of the stomach were additionally treated by retrograde decompression of small intestine using special tube through cecostomy or appendicostomy.

Primary USS was held within the time period of 1-12 hours after hospitalization. Every patient was also examined 3-4 times in dynamics after operation. Results of USS were compared with clinical symptoms and they were verified with intraoperational confirmation.

The following echographic signs were characteristic for children with appendicular peritonitis from the first group. Local intestinal paresis was typical in the right area: there were areas with mute intestine loops and unchanged diameter, intestinal loops with pneumatosis, local liquid accumulation in one or two areas. Difficulties in intestinal chyme movement were observed in the most painful areas. Chyme movement in the other parts of the
abdomen cavity is even and without delay. Local appendicular peritonitis was characterized by spare liquid accumulation in the dome of the cecum.

Patients of the second and third groups had slightly stretched intestinal loops with prevalence of liquid content, chyme movement was slow, onward, and peristaltic movements were rare. In appendicular peritonitis the accumulation of spare liquid was observed in interloop areas, right lateral channel, right ileac area and small pelvis projection.

Distinctly stretched intestine loops with liquid content and air bubbles were observed in patients of the second group (48 children). They did not have intestinal peristaltic motion and chyme movement was slow or absent. Significant amount of liquid could be detected in all parts of the abdomen (5 and more areas).

Observed clinical signs and USS data in patients with DPAP complicated by IP were compared with intraoperative indicators.

Dissemination of inflammatory process outside cecum was examined in patients of the first-second group during operation. Purulent exudation was located between intestinal loops, within borders of low abdominal floor. Parietal peritoneum looked colorless, edematous. Intestinal loops were not changed in diameter; vessels pulsation and intestinal peristalsis were saved.

It was found that inflammatory process spread to the low and medium floors of abdomen cavity, leaving subdiaphragmatic space free in observed children of the third subgroup. Parietal and visceral peritoneum looked edematous, colorless with fibrous applying in ileo-cecal corner. Intestine peristalsis and vessels pulsation were weak, much water and air were seen in the intestinal lumen.

Children of the second group with DPAP complicated by IP had the most severe clinical symptoms. Total injures of parietal and visceral peritoneum was revealed during operation. Peritoneum looked thickened, infiltrated with massive fibrous applying everywhere. Petechial hemorrhages on serous cover of small intestine with multiple interloop abscesses were seen in 38.3% of patients. Intestinal loops were sharply inflated in diameter, filled with intestinal content - "heavy intestine". Intestinal peristalsis was absent, mesentery vessels were sharply decreased, intestine color was changed, hyperemia, walls were thickened, covered with fibrous covering.

Thus, clinical preoperative symptoms were verified during operative revision of abdominal cavity almost at all patients. Comparison of preoperative USS data with results of the intraoperative revision showed identity in 91.2% of cases. Other 8.8% cases demonstrated hyper diagnostics connected with method acquainting.

Using of dynamic USS in postoperative period in all patients with appendicular peritonitis allows revealing not only positive clinical picture, but also acknowledging postoperative intraabdominal complications early. 17 (18.3%) patients of 93 had different intraabdominal complications. USS helped to diagnose postoperative complications in 8 patients on the 4-7th day and 9 patients on the 7-14th day.

2 patients were diagnosed with continuing peritonitis in postoperative period. This complication appeared on the 3-4th day after operation. Severe clinical symptoms, temperature more than 39°C, intoxication symptoms such as - delirium, euphoric condition, and psychomotor excitement were progressing. Other signs comprised tachypnea, tachycardia with more than 120 beats per minute, sharpness of features, lips and skin dryness, reduction of turgor. Abundant stagnant gastric content with a touch of bile and intestinal bacillus smell exuded through tube. Endotoxicosis indicators were on high level, intestinal peristalsis was not auscultated. Palpation revealed expressed or moderate painfulness of abdomen. Anterior abdomen wall muscles tension was moderate or slight, but pronounced positive Shchotkin-Blumberg symptom was revealed.

USS observed the prevalence of liquid content over pneumatization in dilated loops of small intestine, rare peristalsis or its absence, edematous intestine walls, small amount of spare liquid between loops. If such changes are seen after operation, the daily dynamic USS of abdomin-
al cavity organs is required; the absence of positive dynamic requires changing treatment tactics.

Abdominal cavity abscesses (ACA) were found at 12 patients. Among them interloop abscesses were in 3 patients, subhepatic - in 3, right ileac areas - in 4, lateral channel - in 1 and intrapelvic abscess - in 1 patient. Temperature showed tendency to rise on the 3-5th day after operation and soon exceeded 39°C, toxemia indicators increased, local painlessness of anterior abdominal cavity appeared; however, these symptoms were not as strongly pronounced as at progressing peritonitis.

Echographic signs of intra-abdominal abscesses were availability of anomalies of irregular shape with indistinct contours and low echogenicity, often with heterogeneous content. Ultrasound view did not change in dynamics after feeding and intestinal stimulation.

4 patients with unformed interloop multiple and complicated abscesses proceeded to relaparotomy, 8 patients with formed intra-abdominal parietal abscesses proceeded to local minilaparotomy or transcutaneous drainage if abscesses had near-wall location.

Signs of early commissural intestinal obstruction (CII) were marked in 3 children. It was difficult to distinguish paralytic and mechanic intestinal obstruction on USS. Diagnosis became improved when areas of collapsed intestinal loops were seen together with dilated areas. USS allowed discovering intestinal area with peristalsis wave on early stage of CII. Chyme moved like pendulum, as if it struck to an obstacle and moved back. Irregular accumulation of liquid and gases in interloop areas of intestine was marked. Repeated operative invasion was done to patients with CII.

Thus, using of USS before operation in patients with DPAP complicated by IP allows determining not only degree of peritonitis dissemination, but also degree of intestinal motor-evacuative function disorders. Dynamic USS allows forecasting postoperative period course, early disclosure of postoperative intra-abdominal complications and prescribing the most appropriate type of surgical treatment tactics.

References


Dronov, A., Poddubnyi, I., 1999. Laparoscopic operations at children with intestinal obstruction [Laparoskopicheskie operacii pri kishechnoy neprohodimosti u detey], in Russian, Moscow.


