Department of faculty surgery named after professor Yu.M. Lubensky

Topic: Acute intestinal obstruction

lecture No. 7 for 4th grade students
in speciality 31.05.01 General Medicine

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Lecture plan

- **Prevalence and classification of AIO,**
- **DYNAMIC AIO**
  - Clinical picture, diagnosis, differential diagnosis, treatment
- **MECHANICAL AIO**
  - Structure, specifics of pathogenesis, clinical picture, diagnosis, preoperative care, surgical treatment, postoperative management, prognosis

Acute intestinal obstruction

- a syndrome incorporating different diseases leading to the disorder of intestinal passage due to a mechanical obstruction or insufficient motor function of the intestine

Acute intestinal obstruction

- it is a complex of symptoms incorporating many abdominal cavity organ diseases of different aetiology
- amounts to 7-8% of all acute surgical diseases of abdominal cavity organs
- more frequently, the patients are aged 30 to 60 years
- females have the disease 1.5-2 times less frequently than males
- the incidence equals 16 per 100,000 of urban population
- it is the cause of almost 30% lethal outcomes in the whole group of urgent patients

Classification of acute intestinal obstruction

1. Congenital.

a) developmental defects of the entodermal canal;

b) developmental defects of the intestinal wall.

c) impairment of intestinal rotation.

d) developmental defects of other abdominal cavity organs.

2. Acquired

Classification of acute intestinal obstruction

by the mechanism of development:

1. Dynamic (functional) obstruction:
   - a) spastic
   - b) paralytic
2. Mechanical obstruction:
   - a) obturation (only impairment of the intestinal lumen)
   - b) strangulation (compression, pinching of the intestine and its mesentery with simultaneous impairment of patency and blood circulation).
   - c) mixed (intussusception, adhesive AIO).

Classification of acute intestinal obstruction

- Obturation: impairment of passage through different parts of the intestine without impairment of blood supply to the organ (abdominal cavity adhesions, gallstones, bezoars).
- Strangulation: impairment of blood supply to the intestine at the site of passage impairment observed in abdominal cavity adhesions (as a rule, it is a singular band adhesion), intussusception, volvulus and formation of knots. it is the most dangerous form and may be present with necrosis or without it.

Classification of acute intestinal obstruction

By localisation:

1. Small intestine obstruction.
   - high
   - low
2. Large intestine obstruction.

By the degree of intestinal lumen occlusion.

1. Complete.
2. Partial or relative.

Acute intestinal obstruction

- **Small intestine obstruction** occurs in 60% of the cases (among them, it is a complication of adhesive disease in 80-90% of the cases).
- **Large intestine obstruction** occurs in 40% of the cases (among them, it is conditioned by a tumour of the large intestine in 96% of the cases).

Acute intestinal obstruction

- Pathogenesis of the disease is determined by:
  - Nervous and reflex factor
  - Loss of digestive juices
  - Endogenous intoxication
  - Development of infection

Acute intestinal obstruction

- **Nervous and reflex factor:**
  - Manifests most vividly in strangulation obstruction.
  - Compression of the intestine with mesentery containing a large number of nervous receptors, causes to acute pain syndrome and shock.
  - Reflex vomiting appears.

Acute intestinal obstruction

- **Loss of digestive juices:**
  - “Loss” of liquid, electrolytes, enzymes, proteins and other components (in high AIO, may be the cause of premature death).
  - Dehydration and disorder in electrolyte content lead to the impairment of function of the vital organs: heart, lungs, liver, kidneys, etc.

Acute intestinal obstruction

- **Endogenous intoxication:**
  - By the decomposition products as a result of congestion and bacterial breakdown of the intestinal contents.
  - The generated toxins are absorbed through both the afferent intestine and the peritoneum with appearance of concomitant exudate in the abdominal cavity.

Acute intestinal obstruction

- **Development of infection:**
  - More often in strangulation AIO (intestinal necrosis and invasion of pathogenic flora into the peritoneal cavity after several hours).
  - Generalised peritonitis develops that is the main (49%) cause of the lethal outcome.

Clinical picture of intestinal obstruction

- abdominal pain,
- bloating of the abdomen,
- vomiting,
- retention of stool and gases,
- medical history,
- haemodynamic disorders,
- dehydration,
- intoxication.

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Clinical picture of intestinal obstruction

- Examination of the abdomen:
  - *examination of all possible sites of hernial exit*
  - *bloating of the abdomen*
  - *visible peristalsis*
- Palpation
- Percussion
- Auscultation
- Finger examination of the rectum

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Clinical picture of intestinal obstruction

- **Alapy's sign** – tension of the abdominal wall in intussusception of the intestine.

Clinical picture of intestinal obstruction

- **Bailey's sign** – transmission of heart sounds to the abdominal wall. Auscultation of the lower parts is of special value.

Clinical picture of intestinal obstruction

- **Lotheissen's sign** – auscultation of respiratory and heart sounds through the abdominal wall.

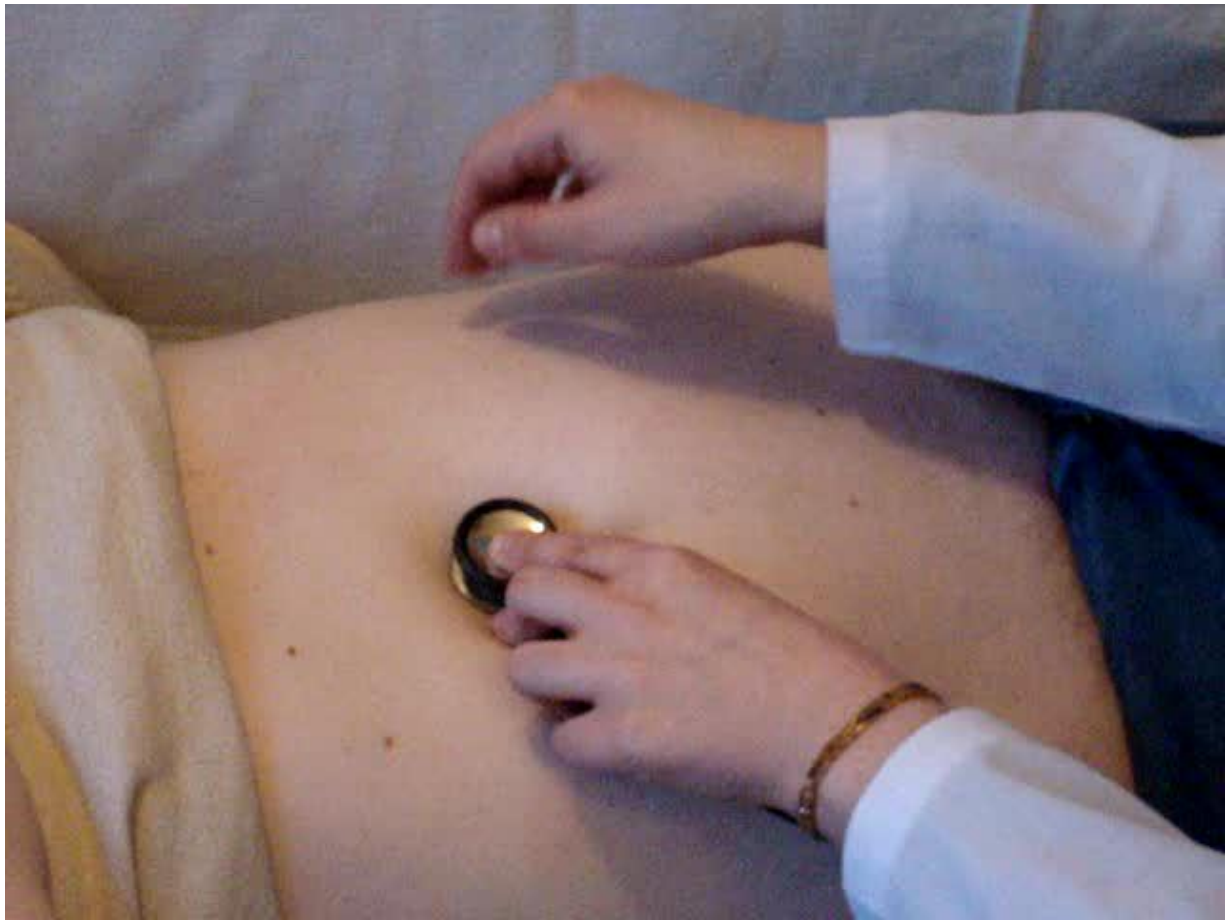
Clinical picture of intestinal obstruction

- **Wahl's sign –** through palpation, a smooth spring-elastic lump is detectable that demonstrates high tympany upon percussion. The symptom indicates the presence of an obstacle in the intestine, due to which the afferent part of the intestine is inflated at the place of the obstacle and limited tympanites.

Clinical picture of intestinal obstruction

- **Kiwull's sign** – high tympany with metallic sound above the swollen loop. It is observed in volvulus of the cecum and the sigmoid colon.

Clinical picture of intestinal obstruction



- **Mathien's sign** – splashing sound detectable upon quick percussion of the supraumbilical region.

Clinical picture of intestinal obstruction

- **Sklyarov's sign –** a sound of splashing liquid accumulated in the stretched and paralysed intestine is audible upon finger percussion of the abdominal wall.

Clinical picture of intestinal obstruction

- **Schlange's sign** - upon push-like irritation of the abdominal wall, hyperperistalsis is revealed (above the obstacle).
- **Baeyer's sign** – asymmetric bloating of the abdomen in volvulus of the sigmoid colon.
- **Spasokukotsky's sign** - the "sound of the falling drop": upon auscultation above the swollen intestinal loop, there is a sound of falling of a drop of liquid from the dome of the loop into the liquid accumulated therein.

Clinical picture of intestinal obstruction

- **Cruveillheir's sign** – blood in the faeces or mucus stained with blood in combination with cramping pain and tenesmus. A sign of intestinal intussusception.
- **Konig's sign** – intensified peristalsis during the seizure of abdominal pain, pitched sounds (gurgling, murmur), diarrhoea or intensification of gas outflow. It is observed with narrowing of the small intestine due to different processes including tumour in case of obturation intestinal obstruction.

Clinical picture of intestinal obstruction

- **Obukhovskaya hospital symptom (according to I.I. Grekov)** – finger examination of the rectum detects weakness of the external anal sphincter and balloon-like stretched and empty rectal ampulla. Not detectable in case of high obstruction within the early hours of the disease.
- **Tsege-Manteuffel's sign** (in volvulus of the sigmoid colon and low obturations): it is impossible to introduce over 500ml of liquid into the rectum as a larger volume flows outside past the tube.

Clinical picture of intestinal obstruction

1. Stage of “ileus cry” (the initial stage of AIO). It is associated with the impairment of intestinal passage (the stage of local manifestations) and has the duration of 2-12h (up to 14h).

2. Stage of intoxication (intermediate stage if AIO, the stage of false wellbeing). This stage is characterised by the impairment of microcirculation of the intestinal wall (lasts for 12-36h).

3. Stage of peritonitis (late, terminal stage of AIO) comes after 36h after the disease onset. Pronounced functional disorders of haemodynamics are characteristic to this period.

Clinical picture of intestinal obstruction

- *Stage of "ileus cry"* - the stage of local manifestations of acute intestinal passage impairment with the duration of 2-12 hours depending on the form of obstruction. Within this period, the pain syndrome and local abdominal symptoms are dominant.

Clinical picture of intestinal obstruction

- *Stage of intoxication* - the stage of false wellbeing characterised by the development of acute intestinal failure, water-electrolyte disturbances and endotoxemia. Usually, it lasts for 12-36 hours. At this stage, the pain loses its cramping pattern, becomes more constant and less intense. The abdomen is intensively bloated, intestinal peristalsis weakens, the “splashing sound” is auscultated. Complete retention of stool and gases.

Clinical picture of intestinal obstruction

- *Stage of peritonitis* - the stage of peritonitis and severe abdominal sepsis, it is often called the terminal stage, which is not too far from truth. It comes 36 hours after the disease onset. Characteristic features of this period are the manifestations of severe systemic inflammatory reaction, appearance of multiple organ dysfunction and failure, pronounced intoxication and dehydration as well as progressive haemodynamics disorders. The abdomen is significantly bloated, peristalsis is not auscultated, peritoneal symptoms are registered.

Dynamic intestinal obstruction

- 4-10% of all cases of acute intestinal obstruction
- forms of dynamic intestinal obstruction:
  - Spastic (spastic ileus)
  - Paralytic (paralytic ileus)

Spastic form of dynamic intestinal obstruction

- abdominal cavity trauma
- nervous system diseases (tabis dorsalis)
- reflex influence in diseases of the organs of the thoracic and abdominal cavity (renal colic, acute myocardial infarction)
- hypovitaminosis
- flaws in the diet (overeating, intake of coarse food)
- helminthic invasion
- poisoning with lead, morphine, nicotine

Complaints in spastic ileus

- pronounced cramping pain in the abdominal cavity,
- repeated vomiting with gastric contents,
- intestinal spasms may last from several hours to several days,
- the condition of patients remains satisfactory with unimpaired activity of the cardiovascular system and respiration.

Clinical picture of spastic ileus

- Moist tongue;
- Usual configuration of the abdomen, it is soft and painless;
- Sometimes it is possible to detect spastic part of the intestine through palpation;
- Negative Shchetkin-Blumberg sign;
- Auscultation reveals usual intestinal sounds;
- Stool may be retained, the gases flow freely;
- Uncomplication urination;
- Normal values of blood and urine analysis;
- Survey X-ray imaging of the abdominal cavity shows no changes;

Treatment of spastic ileus

- *Conservative treatment*:
  - bilateral lumbar blockade with 0.25% Novocaine solution
  - injection of 1ml 0.1% atropine solution;
  - warmth on the abdomen
  - warm baths

Paralytic form of dynamic intestinal obstruction

- after surgery on abdominal cavity organs
- in peritonitis
- after overeating and intake of “poorly digestible” food
- in damage to the organs of abdominal cavity and retroperitoneal space
- in impairment of blood supply to the bowel

Complaints in the paralytic form of dynamic intestinal obstruction

- generalised pain;
- bloating of the abdomen;
- retention of stool and gases.
- condition of the patient gradually deteriorates due to the growing intestinal paresis

Clinical picture of paralytic ileus

- uniform bloating of the abdominal cavity
- periodic vomiting with gastric or intestinal contents
- retention of stool and gases
- thoracic breathing, rapid
- moderate tachycardia
- flaccid or absent peristalsis upon auscultation
- soft and painless abdomen upon palpation at the initial stages

Clinical picture of paralytic ileus

- **In case of progression of the disease and development of peritonitis:**
  - tachycardia up to 140 beats per minute
  - hypotension
  - tension of the anterior abdominal wall muscles,
  - positive Shchetkin-Blumberg sign,
  - intensification of AIO symptoms.

Treatment of paralytic ileus

- must be aimed at *liquidation of the main disease*
- conservative treatment:
  - bilateral lumbar Novocaine blockades
  - constant evacuation of the gastric contents
  - repeated siphoning enemas
  - intravenous injection of 50-100ml of 5-10% sodium chloride solution
  - in case of retained peristalsis: Proserin or Pituitrin, Kolimin
  - application of autonomous GIT electric stimulators is possible

STRANGULATION MECHANICAL INTESTINAL OBSTRUCTION

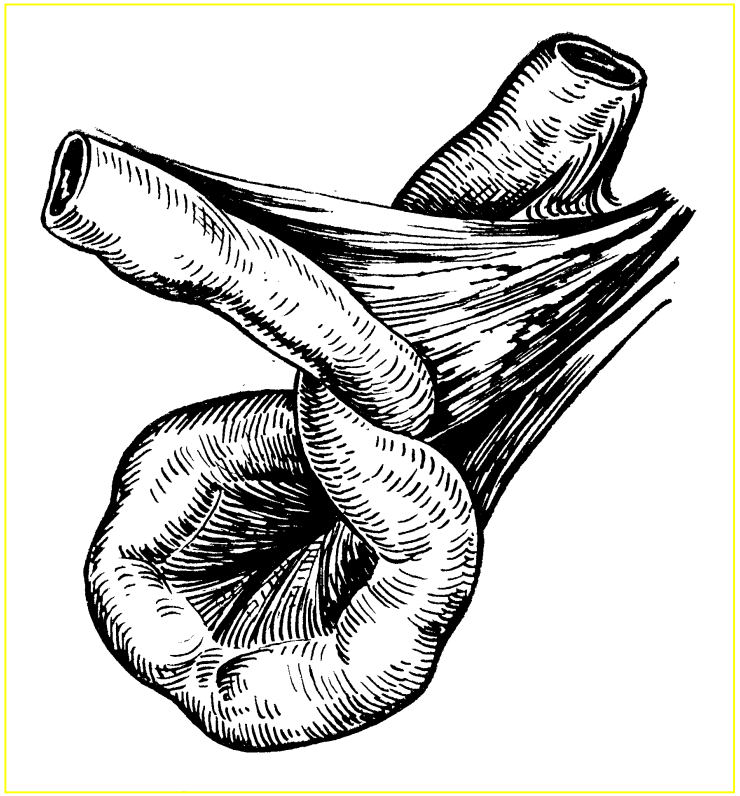
- ***Accompanied by impairment of blood supply to the intestinal wall due to the involvement of the mesentery into the process: the most severe form of mechanical obstruction which presents a very high case fatality rate.***

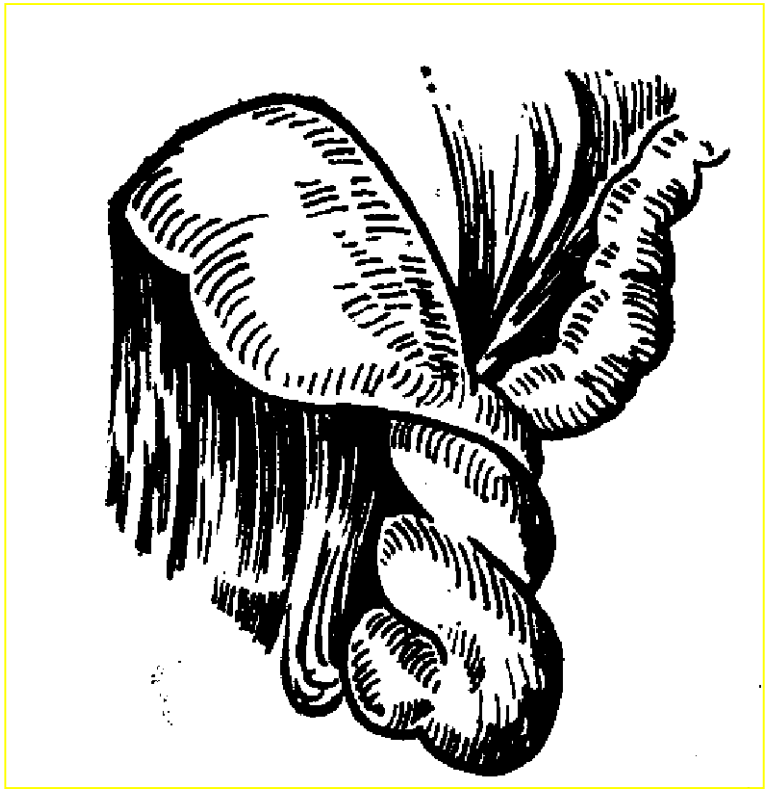
- **<u>Includes:</u>**
  - **Volvulus**
  - **Knot formation**
  - **Strangulation of the intestine**

STRANGULATION MECHANICAL INTESTINAL OBSTRUCTION

- Volvulus: 15-30% among all types of mechanical obstruction
- Complete (with a twist from 270-360 to 540 and 720 degrees) and incomplete (with a twist at 180 degrees) volvulus is distinguished.
- The course of the disease is aggressive, accompanied by sharp pain, severe general condition and rapid development of necrosis

STRANGULATION MECHANICAL INTESTINAL OBSTRUCTION

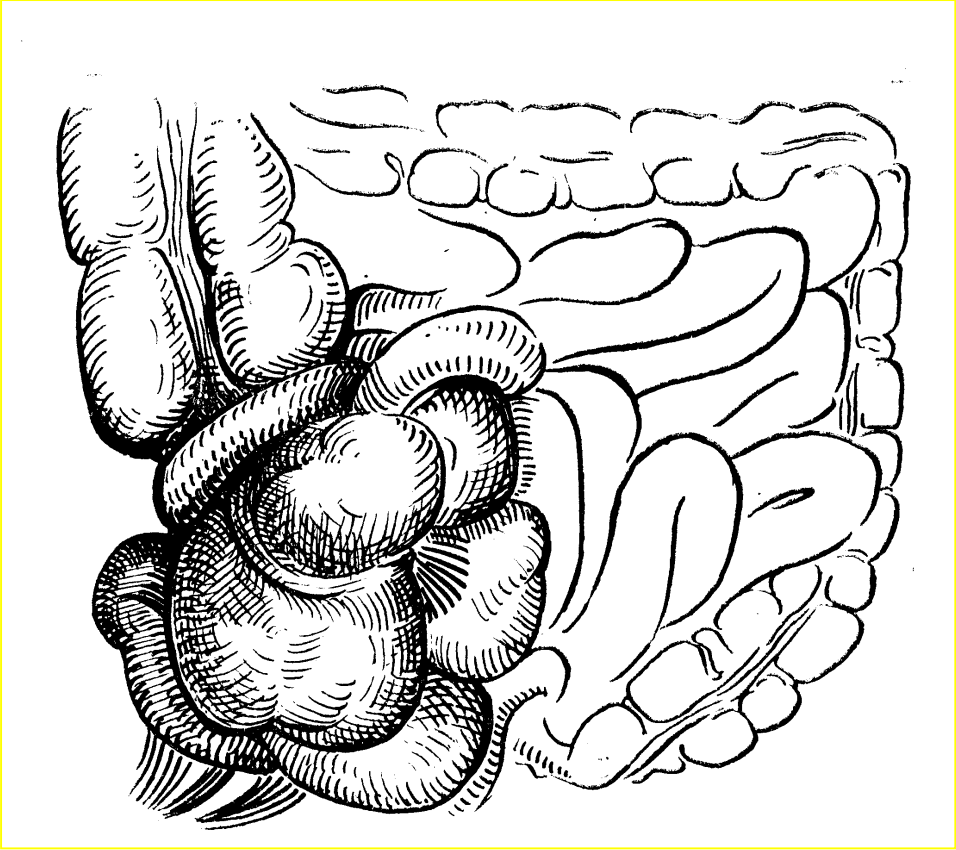




STRANGULATION MECHANICAL INTESTINAL OBSTRUCTION

- Knot formation is a rare form of acute intestinal obstruction (2-5%)
- In 90% of the cases, the knot is formed between the small intestine and the sigmoid colon, less often between the loops of the small intestine, even less often between the small intestine and the transverse colon or caecum
- Vermiform appendix of Meckel's diverticulum may participate in knot formation
- The knot, due to intensified peristalsis and growing oedema, is impossible to untangle not only during the surgery but during the section as well
- It becomes necessary to resort to extensive resections of both the small and the large intestine
- Presents a very high case fatality rate

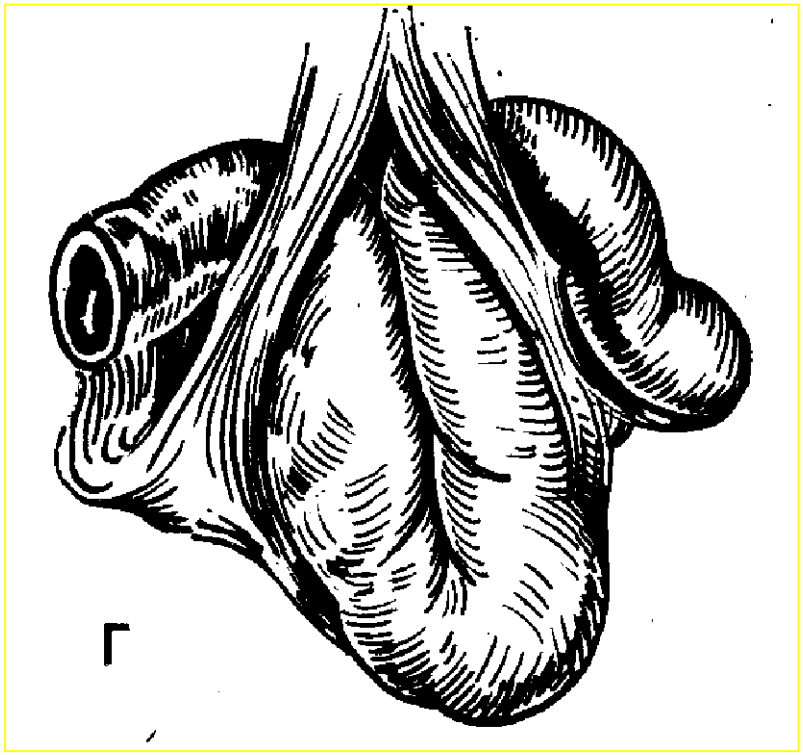
STRANGULATION MECHANICAL INTESTINAL OBSTRUCTION

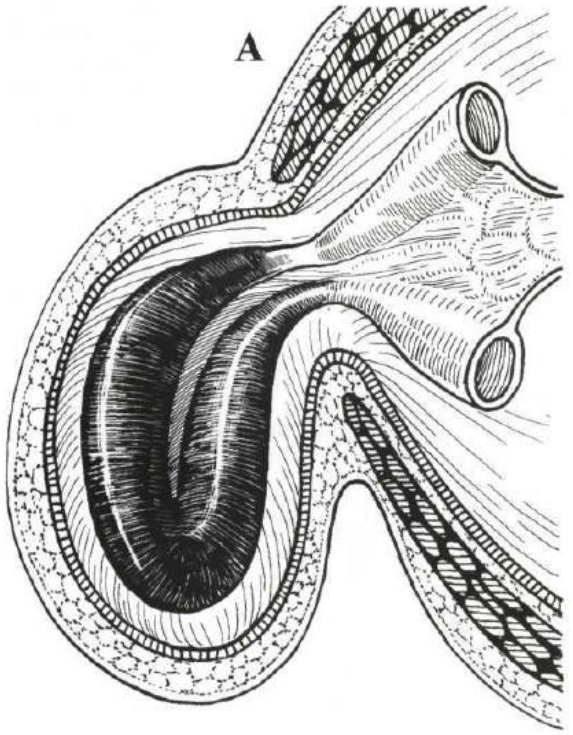


STRANGULATION MECHANICAL INTESTINAL OBSTRUCTION

- Strangulated hernia is noted in 1-2% of AIO patients
- More often, strangulated hernias are located in the deep ring of the inguinal and the femoral canals, omental foramens, under the ligament of Treitz, in the ring formed by the vermiform appendix.
- Less often – in case of strangulation of internal hernias in the diaphragmatic apertures, semilunar line, obturator foramen and the mesentery, in the posterior part of the rectouterine pouch, in recessus retrocaecalis, ileocaecalis, intersygmoideus.
- In 90% of the observations – a small intestine loop, in singular cases – transverse colon, sigmoid colon, caecum and stomach.

STRANGULATION MECHANICAL INTESTINAL OBSTRUCTION





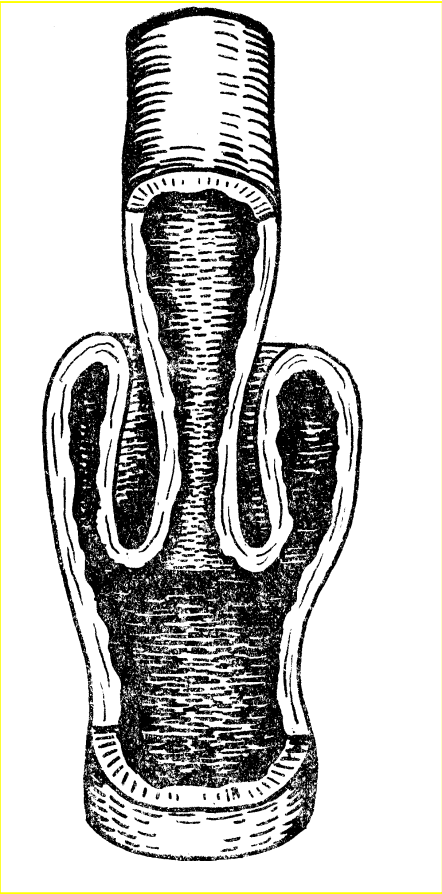
Obturation obstruction

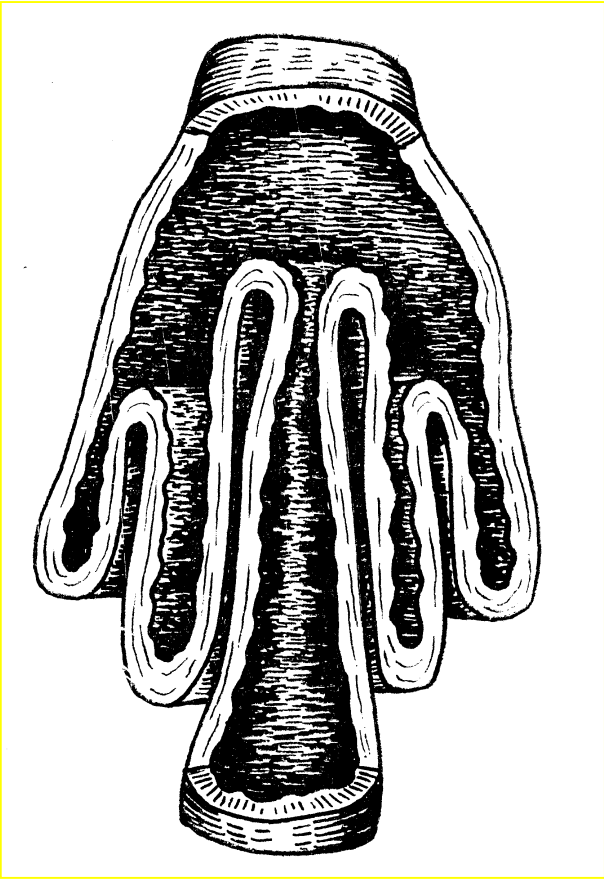
- External compression of the intestine by an enlarged, displaced or inflammatory changed organ of the abdominal cavity, tumour, cyst or adhesions
- Internal occlusion or narrowing without (fecal stones, gallstones, foreign bodies, ascariasis balls) or with involvement of the intestinal wall (intestinal tumours, cicatricial stenosis, cysts)
- This type of obstruction begins gradually, may be present as chronic partial obstruction capable of conversion into a complete one

Intussusception

- invagination of one part of the intestine into another
- In the beginning, it is present as the obturation type. With growing involvement of the mesentery into the process, it acquires the strangulation-type nature
- Intussusception may be simple or double- or triple-staged, when 5-7 cylinders are formed
- Most often, the ileum folds into the caecum (ileocecal intussusception); less often, the small intestine invaginates into the small intestine (entero-enteric intussusception). The rarest form is colo-colic intussusception occurs upon invagination of the large intestine into the large intestine, rarely – invagination of the small intestine into the stomach in the area of gastroenteroanastomosis
- Intussusception occurs more often in children at the age of 8-10 months (30-40% in all obstruction cases)
- The predisposing factors are dysentery, adenoviral infection; everything that leads to intensification of peristalsis and development of spasms. May assume chronic, relapsing course

Intussusception

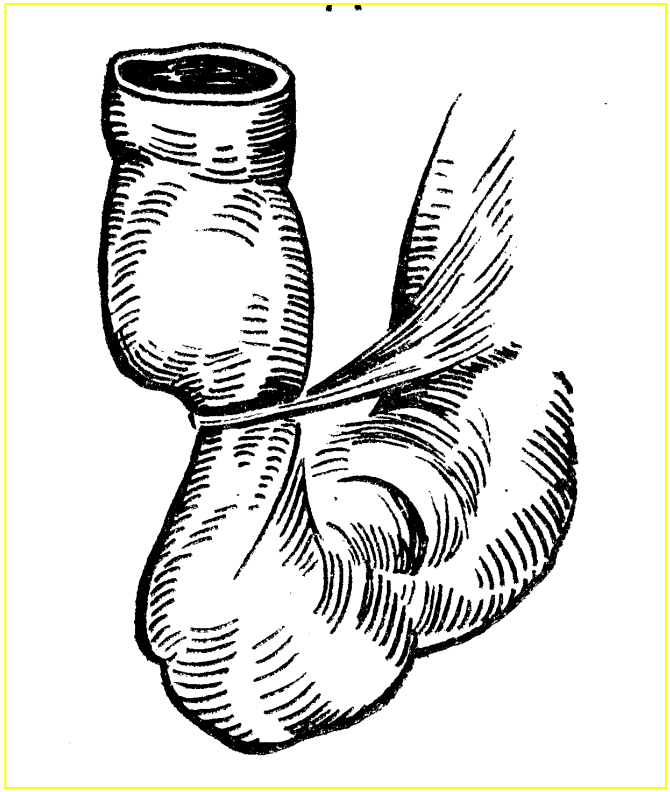


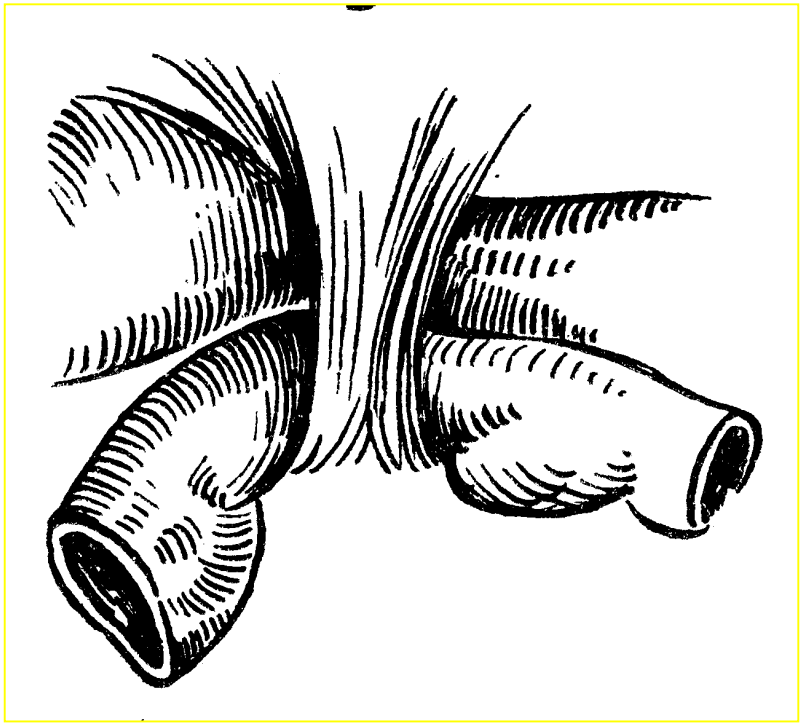


Adhesive intestinal obstruction

- Over the past years, it has been registered especially often (35-87%)
- The increase of frequency has been attributed to the growth of number of abdominal surgeries
- More often, it develops after appendectomy (51%), less frequent are gynaecological surgeries, surgeries for intestinal obstruction, etc.
- A major role in development of adhesive obstruction is played by peritonitis as an aetiological factor
- It is present as strangulation in 75% and obturation in 25% of the cases
- If adhesive obstruction relapses repeatedly, it is considered as the “adhesive disease”

Adhesive intestinal obstruction





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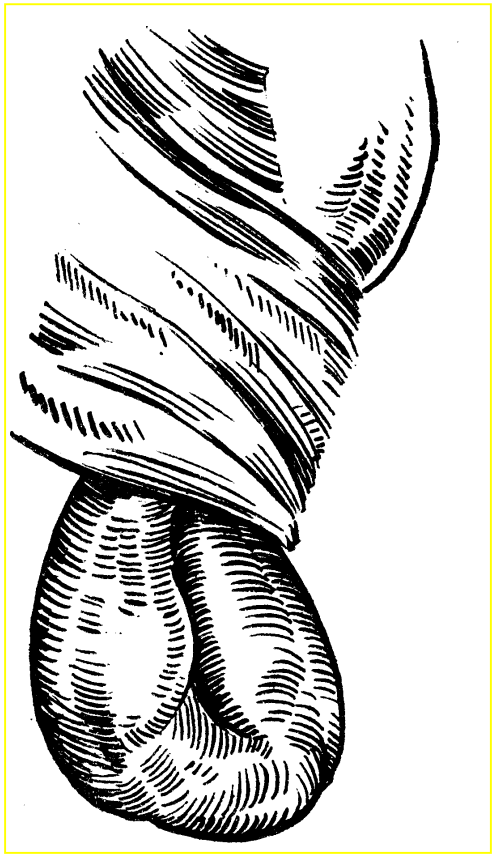
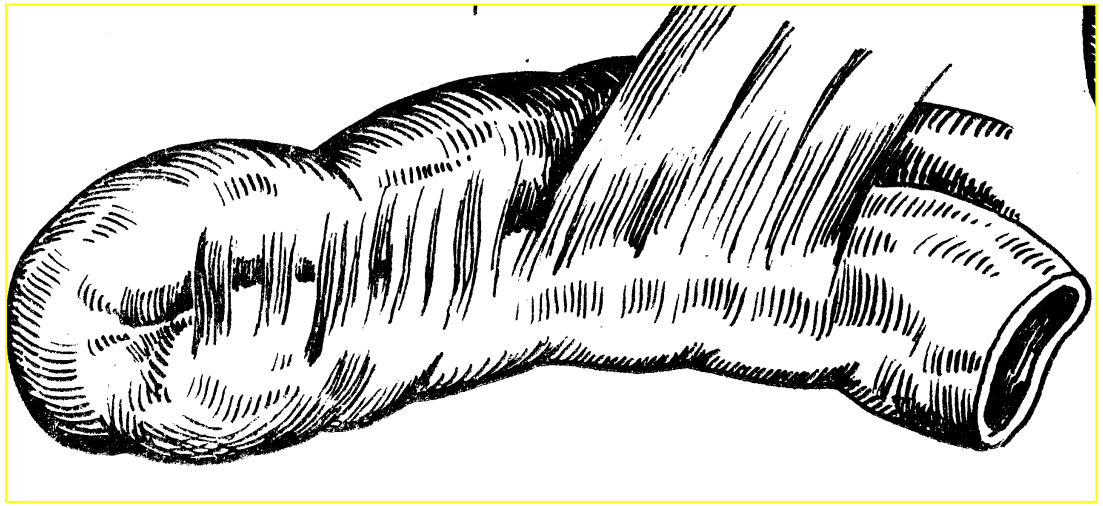




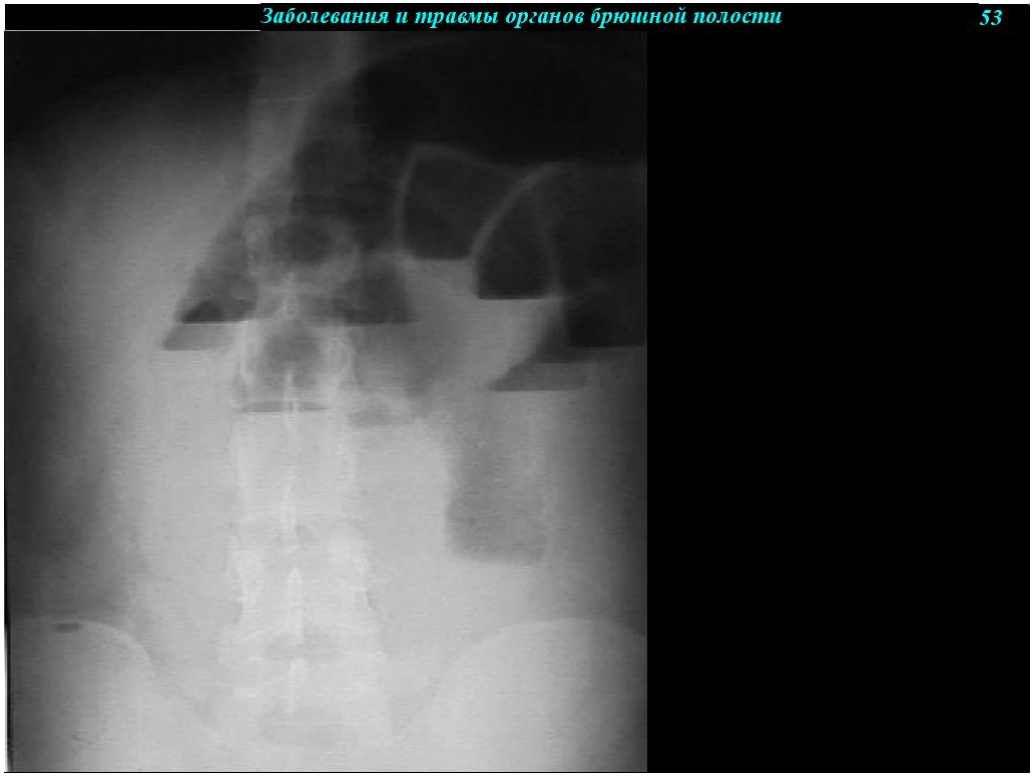
Protocols of therapeutic and diagnostic care in acute intestinal obstruction at the prehospital stage

- Diagnosis or justified assumption of AIO are the rationale for immediate referral of the patient to the surgical inpatient facility via an ambulance lying on the stretcher.
- The promptness of admission of such patients into medical facilities determines, to a great extent, the prognosis and the outcome of the disease. The later the patients with acute intestinal obstruction are hospitalised, the higher the case fatality rate is.

Diagnosis of acute intestinal obstruction

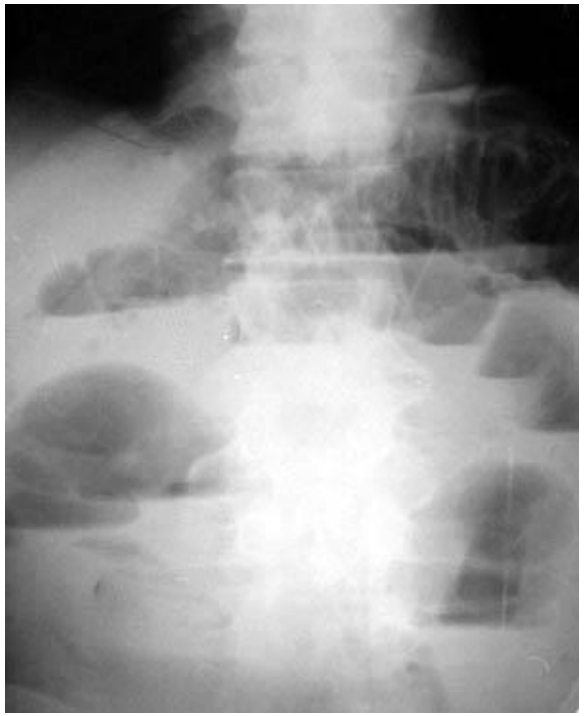
- ✓ thoroughly taken medical history
- ✓ scrupulous detection of clinical signs of the disease
- ✓ analysis of radiological and laboratory data

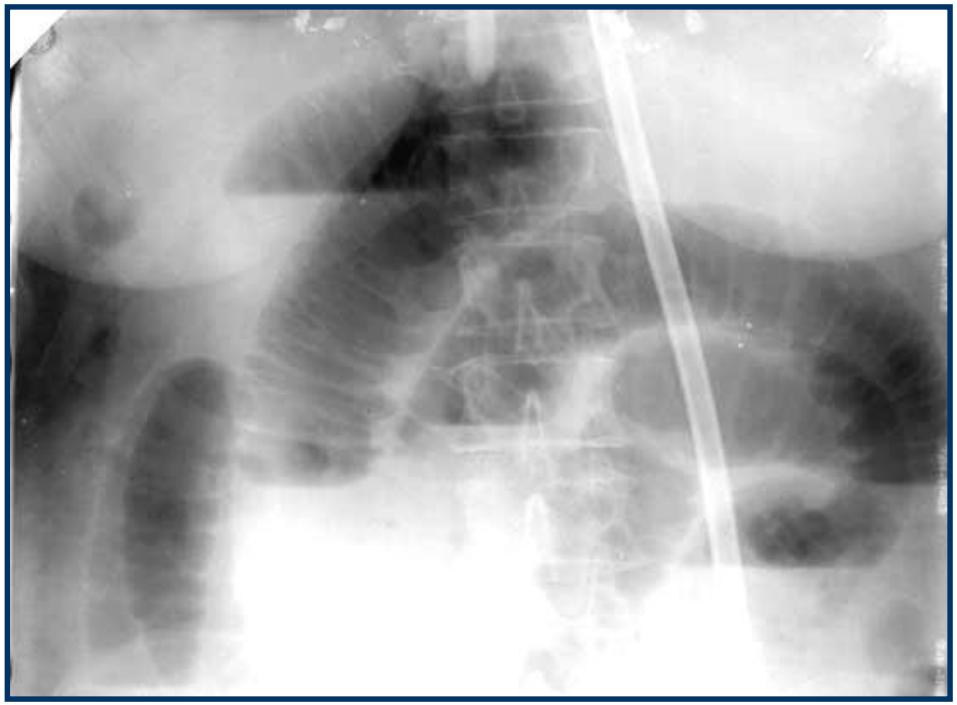
Radiological diagnosis of acute intestinal obstruction



- **Hintze's sign** – radiological detection of gas accumulated in the intestine, compliant with the Wahl's sign.

Radiological diagnosis of acute intestinal obstruction





- **Casey's sign** – transverse striation of stretched loops of the small intestinal identified on radiograms.
  Synonyms: **fish skeleton symptom, Frimann-Dahl's sign**

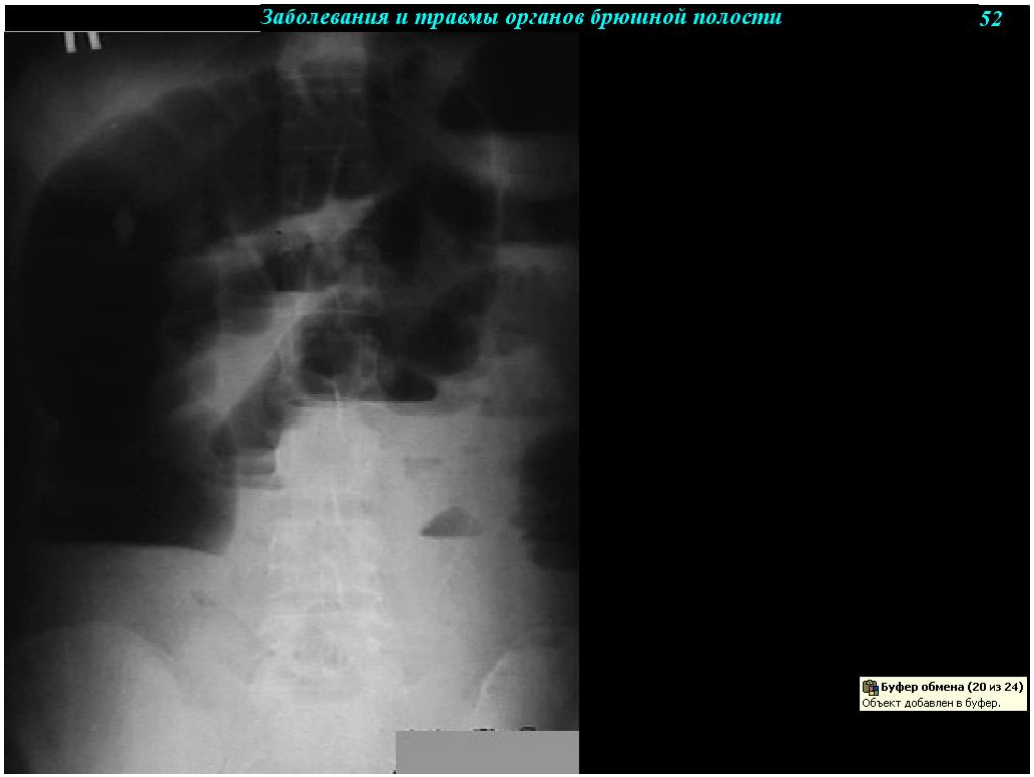
Radiological diagnosis of acute intestinal obstruction

- **Rovenkamp's sign** – radiologically identified deceleration of contrast mass passage through the small intestine in absence of stenosis.

Radiological diagnosis of acute intestinal obstruction

- **Kloiber's sign** – horisontal levels of liquid and gas bubbles above them in radiological analysis.

Radiological diagnosis of acute intestinal obstruction



- **Stierlin's sign –**a stretched and tense loop identified through palpation is matched by an arch-shaped area of accumulated gas visible via X-ray examination. Points and the site of obstruction.

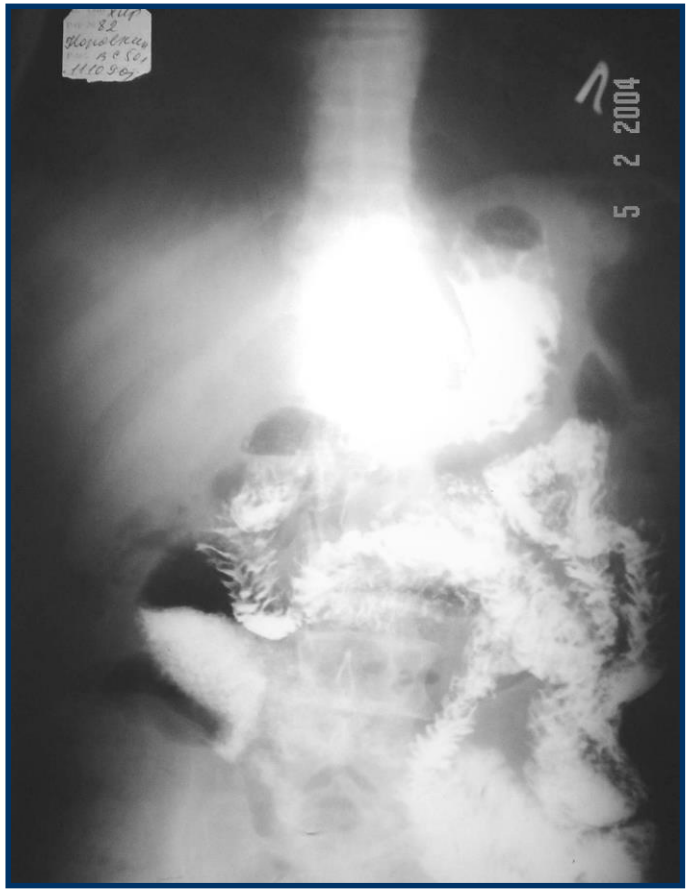
Radiological diagnosis of acute intestinal obstruction

- In unclear clinical picture of small intestine obstruction – ***barium passage control*** *(Schwartz's test)*
- For this, the patient is given 100-200ml of liquid barium suspension. A survey X-day image is taken after **2, 4 and 6** hours

Radiological diagnosis of acute intestinal obstruction

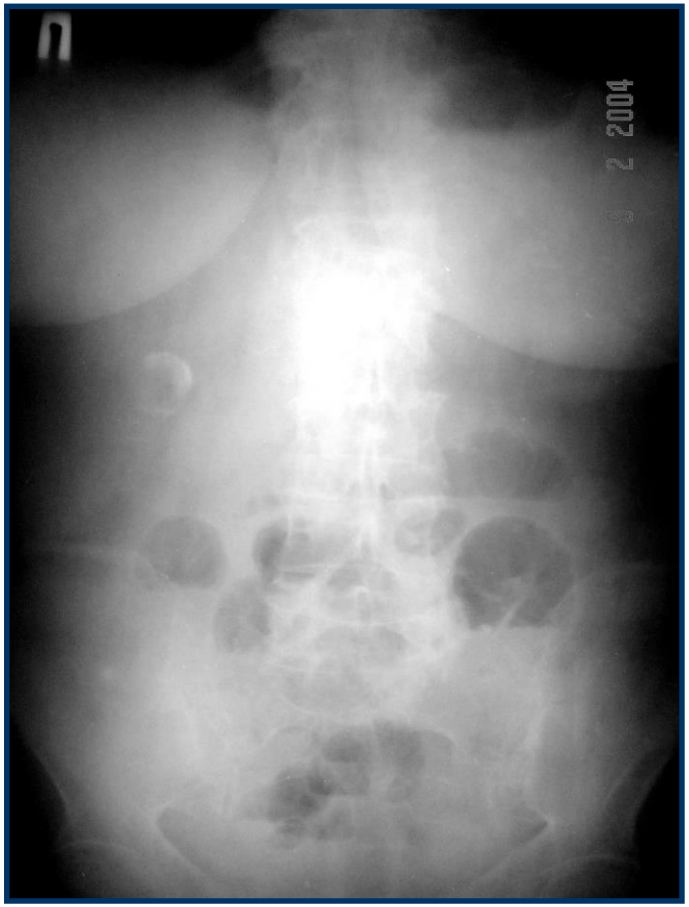
- It is recommended to use undiluted radiocontrast agents containing iodine (that do not inhibit peristalsis, are easily eliminated from the organism and are easily removed in case of entering the abdominal cavity)
- It is recommended to perform X-ray monitoring of contrast agent passage through the gastrointestinal tract at the intervals of 6 hours

Radiological diagnosis of acute intestinal obstruction



Radiological diagnosis of acute intestinal obstruction

Radiological diagnosis of acute intestinal obstruction

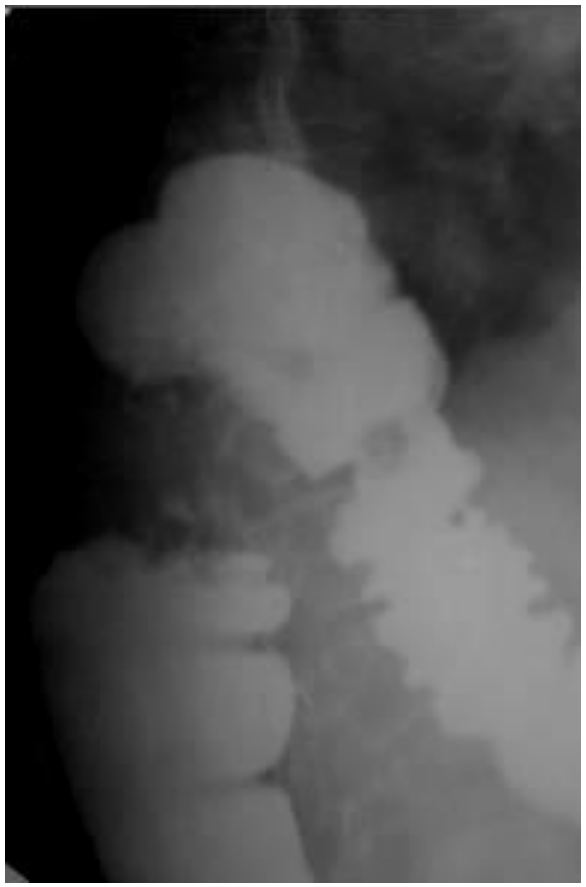


Radiological diagnosis of acute intestinal obstruction

Radiological diagnosis of acute intestinal obstruction

- In suspected large intestine AIO, an examination of the large intestine is required: the – ***contrast enema***.
- Contrast enema makes it possible to specify:
  - localisation
  - type and length of obturation
  - “defect” of filling
  - suprastenotic dilation

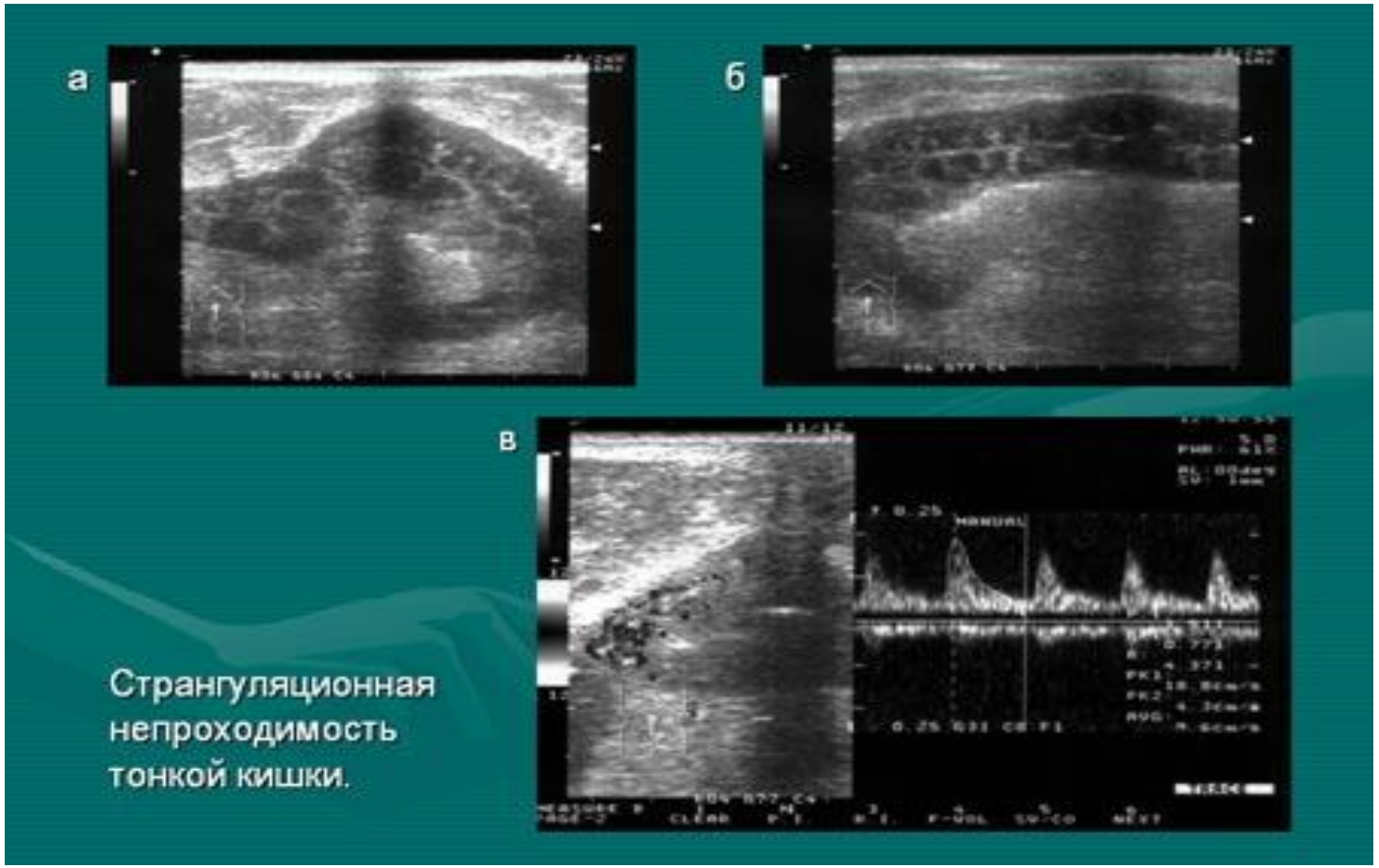
Radiological diagnosis of acute intestinal obstruction



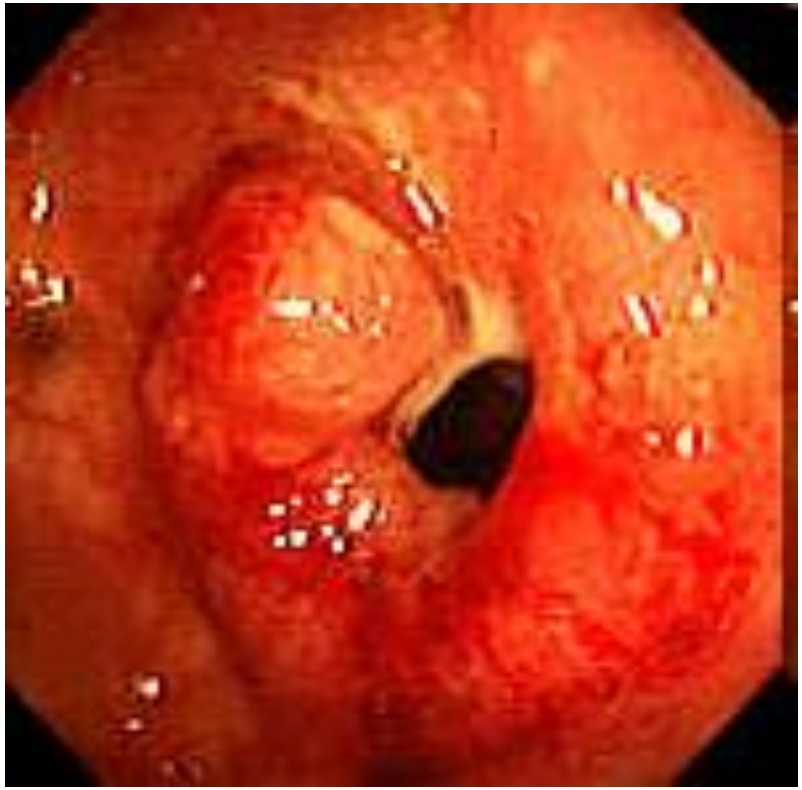
Ultrasound imaging of internal organs (complex)

- dilation of the intestine diameter over 25mm associated with deposition of liquid in its lumen;
- thickening of the intestinal wall due to its oedema; visualisation of folds of the intestinal mucosa; presence of free liquid in the abdominal cavity;
- pendular movements of the intestinal contents

Ultrasound diagnosis



Endoscopic diagnosis of acute intestinal obstruction



Endoscopic diagnosis of acute intestinal obstruction

Endoscopic diagnosis of acute intestinal obstruction

- In order to resolve diagnostic difficulties in the symptom complex of AIO, **laparoscopy (!)** is applied in some cases

Laboratory diagnosis

- complete blood count and urinalysis
- urine analysis for **!diastase! (pancreatitis – the "sentinel loop" symptom)**
- evaluation of protein and protein fractions content
- evaluation of electrolyte content!!! (potassium, sodium, calcium)
- evaluation of acid-base status
- evaluation of blood chlorides
- evaluation of residual nitrogen and haematocrit

Laboratory diagnosis

- Changes in laboratory tests in mechanical AIO:
  - ✓ elevation of haematocrit
  - ✓ hyperazotaemia
  - ✓ hypernatraemia
  - ✓ hyperchloraemia
  - ✓ appearance of respiratory alkalosis
- The change of sodium and chlorine content depends not on the type of obstruction but on the duration. Hypernatraemia, hyperchloraemia and an increase in residual nitrogen develop on days 2-3 of the disease

Principles of treatment procedures

1. **All patients with suspected obstruction bust me urgently hospitalised into a surgical inpatient facility.** The promptness of admission of such patients into medical facilities determines, to a great extent, the prognosis and the outcome of the disease. The later the patients with acute intestinal obstruction are hospitalised, the higher the case fatality rate is.

Principles of treatment procedures

2. **All types of strangulation intestinal obstruction as well as any types of intestinal obturation complicated by peritonitis require emergency surgical intervention.** In connection with the severe condition of the patients, only short-term (no longer than 1.5-2 hours) intensive preoperative care may be justified.

Principles of treatment procedures

3. Dynamic intestinal obstruction is subject to conservative treatment because surgical intervention per se leads to development or aggravation of intestinal paresis.

Principles of treatment procedures

4. **Doubts in the diagnosis of mechanical intestinal obstruction in absence of peritoneal symptoms attest to the necessity of conservative treatment.** It arrests dynamic obstruction, eliminates some types of mechanical obstruction, serves as preoperative care in cases when this pathological state does not resolve under the influence of therapeutic procedures.

Principles of treatment procedures

5. Conservative treatment must not serve as a justification for unsubstantiated delay of surgical intervention, if necessity of the latter has already arisen. The decrease of case fatality rate in intestinal obstruction may by primarily provided by the active surgical tactics.

Principles of treatment procedures

6. **Surgical treatment of mechanical intestinal obstruction suggests persistent postoperative care of water-electrolyte disorders, endogenous intoxication and paresis of the gastrointestinal tract,** which may cause the patient's death even after elimination of the obstacle to passage of the intestinal contents.

Preoperative care

- Introduction of the nasogastric probe and emptying of the stomach.
- Prescription of broad-spectrum antibiotics for prevention of infectious complications.
- Correction of homeostasis disorders and restoration of the circulating blood volume.
- Paranephric bilateral Novocaine blockade.

Preoperative care

- Freeing of the large intestine from faeces and gas using the siphoning enema.
- Introduction of spasmolytic agents (atropine, papaverine, No-Spa, etc.)
- Absence of effect of the treatment for 2-4 hours is an indication to surgical treatment.

Aims of surgical treatment

1. Elimination of the obstacle to passage of the intestinal contents.
2. Liquidation (if possible) of the disease that caused the development of this pathological condition.
3. Gastric resection in case of non-viable stomach.
4. Prevention of postoperative endotoxicosis growth.
5. Prevention of obstruction relapse.

Surgical treatment

1) Examination of the intestine with its revision
   a) from the ileocecal angle to the ligament of Treitz and to the rectum or
   b) from the ligament of Treitz to the rectum.

The intestinal loops are bloated above the site of obstacle and decreased below it; if only small intestines are bloated then the obstruction is high and it is low in case of large intestine involvement. In very high obstruction (for example, occlusion of duodenum by a gallstone) bloating of the abdomen may be absent.

2) Elimination of obstruction – detorsion, deintussusception, adhesiotomy, dissection of the hernial orifice.

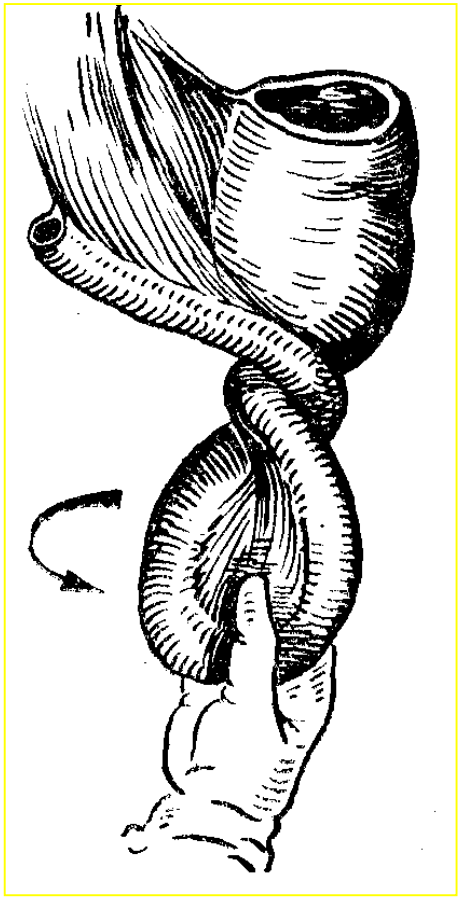
Surgical treatment

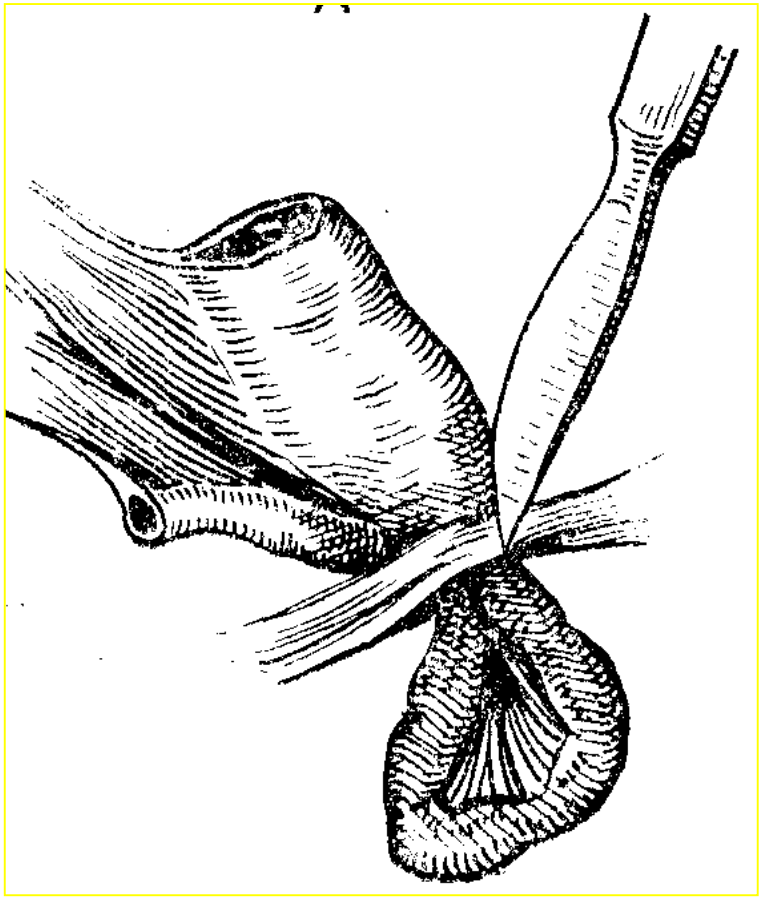
3) Evaluation of vitality of the intestine – normal colour, glossiness of the serosa, presence of peristalsis and pulsation of mesenteric vessels.
4) Resection of the changed part of the intestine within the limits of 40cm of the afferent intestine and 10-15cm of the efferent one with subsequent anastomosis (end-to-end, end-to-side, side-to-side).
5) In some cases, patients in severe condition are given exteriorisation of the end of the resected intestine or even of the whole impaired intestine without its resection.

Surgical treatment

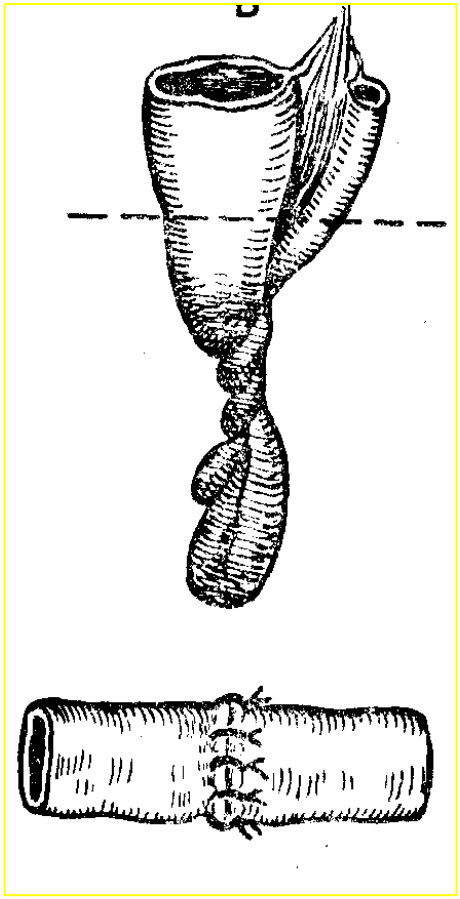
6) In case of overstretched loops: strain relief procedures – intestinal decompression – nasogastric intubation of the small intestine with special probes, drainage of the small intestine through suspension enterostomy or cecostomy, gastrostomy; of the large intestine through the preoperatively introduced thick probe that is supposed to be placed intraoperatively at a place higher than the obstacle
7) Sanitation and drainage of the abdominal cavity.
8) Closure of the surgical wound.

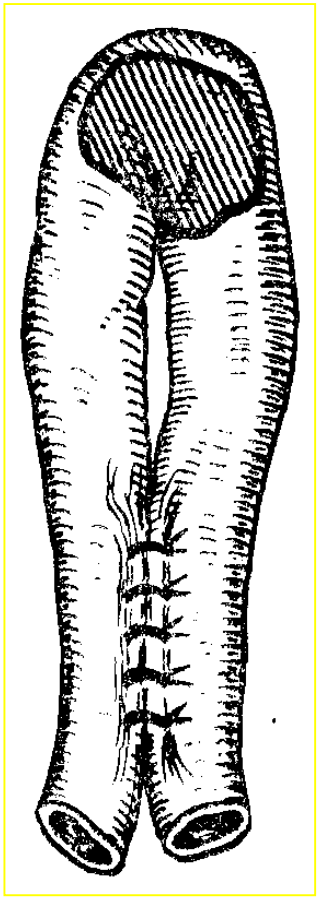
AIO. Surgical treatment. Techniques for restoration of intestinal patency



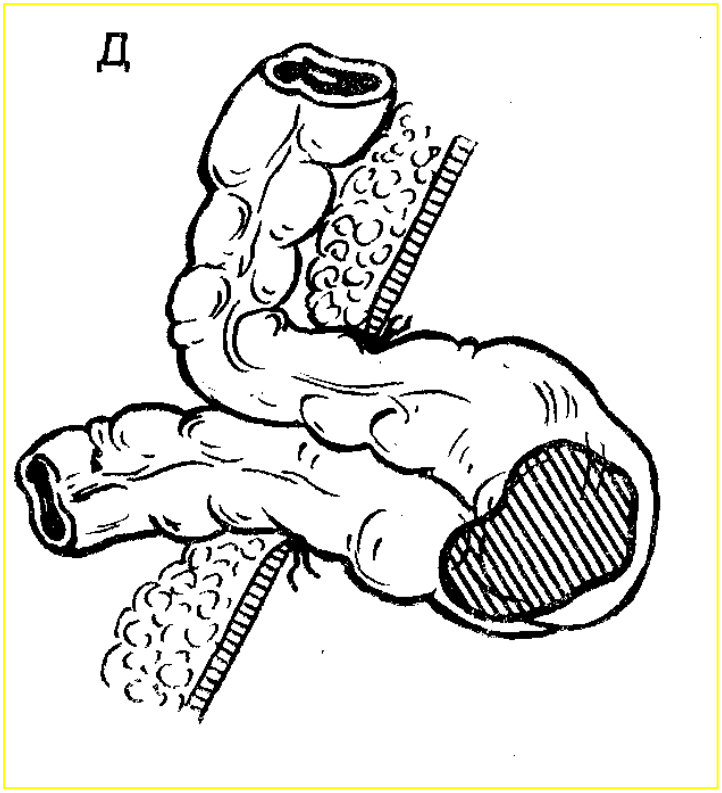


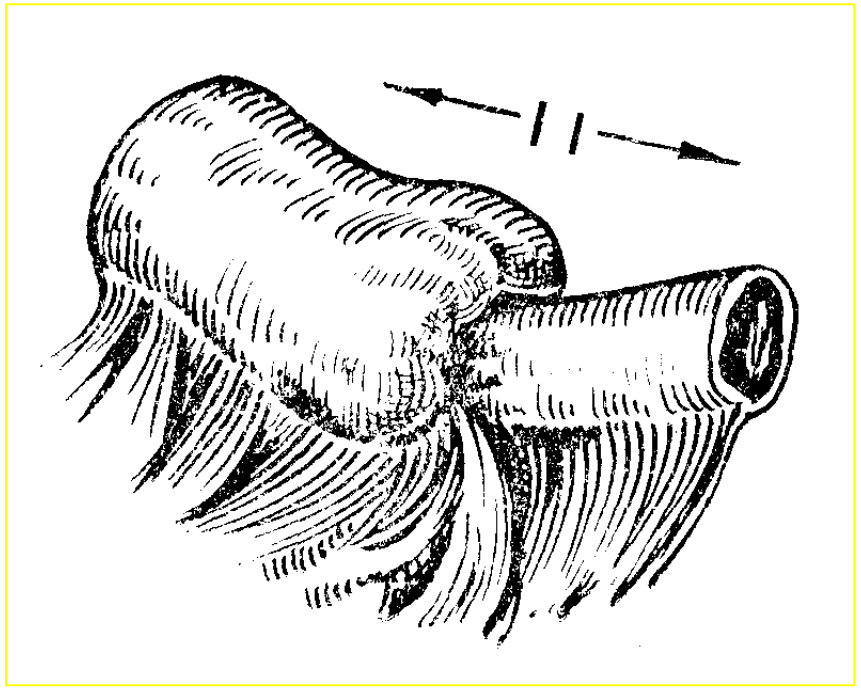
AIO. Surgical treatment. Techniques for restoration of intestinal patency





AIO. Surgical treatment. Techniques for restoration of intestinal patency





Signs of non-viability of the intestine

- Abnormal tint of the serous membrane and intestinal mesentery (down to the black colour)
- The serous membrane is dull, matte
- Absence of peristalsis in the intestine
- Mesenteric vessels of the intestine do not pulsate

Postoperative management

1) Correction of metabolic disorders, control of dehydration and detoxication therapy with constant monitoring of all indices

2) Control of infection: broad-spectrum antibiotics within the initial 3 days, metronidazole (for control of anaerobic infection)

3) Control of paralytic ileus: aspiration of the gastric contents through the nasogastric probe, paranephric blockades, gas venting tubes, siphoning and cleansing enemas, stimulation of the intestine (Proserin, Cerucal, Pituitrin, hypertonic solution of sodium chloride, electric stimulation)

Postoperative management

4) Cardiac pharmaceuticals (if necessary, with inclusion of hormonal agents – corticosteroids)

5) Prevention of pulmonary complications – oxygen therapy, pulmonary gymnastics, massage

6) General conditioning and symptomatic treatment – vitamins, immunostimulants, physical therapy

7) Nutrition per os (or a probe) starting from days 1-2 after the surgery

8) Early standing and active management of the patients.

Prognosis

- Case fatality rate in AIO depends on the promptness of hospitalisation.
- Early surgical intervention (initial 3 hours) usually concludes with organ-sparing intervention (volvulus elimination, adhesiotomy, deintussusception, etc.).
- Early surgery makes it possible to achieve the most favourable results and the case fatality rate after such surgeries does not exceed **5%.**

Prognosis

- Late surgery for AIO necessitates extensive intestinal resections, long-term intensive care aimed at the correction of water-electrolyte disorders and treatment of peritonitis.
- Case fatality rate in late surgery is 25% and depends on the promptness of hospitalisation and the time of intervention.

Prognosis

Case fatality rate also depends on the:

- Patient's age: it may even reach 30-40 and even 56% in the elderly
- Obstruction type: it is significantly higher in strangulation types and exceeds 90% in the vascular type

Acute disorder of mesenteric circulation

- The most frequent causes of the disease are atherosclerotic impairments of the heart and vessels, rheumatic heart diseases, hypertensive disease, diseases of the liver and spleen.
- In the vast majority of patients, heart rhythm disorders are present.
- Arterial embolism occurs in 44% of the patients, arterial thrombosis – in 33%, non-occlusal disorders – in 13% of the cases and venous thrombosis in 10%.

Classification of acute disorders of mesenteric circulation

Types of disorders

- *Non-occlusal*
  - With incomplete arterial occlusion
  - Angiospastic
  - Associated with centralisation of haemodynamics

Classification of acute disorders of mesenteric circulation

- *Occlusal*
  - Embolism
  - Arterial thrombosis
  - Venous thrombosis
  - Arterial ostia covered on the side of aorta due to atherosclerosis and thrombosis
  - Arterial occlusion as a result of dissection of the aortic walls
  - Compression (ingrowth) of the vessels by tumours
  - Ligation of vessels

Classification of acute disorders of mesenteric circulation

Stages of the disease

- Ischaemia (haemorrhagic suffusion in venous thrombosis)
- Intestinal infarction
- Peritonitis

Classification of acute disorders of mesenteric circulation

Course

- Compensation of mesenteric circulation
- Subcompensation of mesenteric circulation
- Decompensation of mesenteric circulation (slowly or rapidly progressing)

Clinical picture

- *Abdominal pain* - extremely intense, comparable to pain in volvulus of the small intestine. The most severe pain is observed during the disease onset: ***at the stage of ischaemia*** that lasts for 6-12 hours. A characteristic feature is the absence of effect from narcotic drugs. Some analgesic effect may come after injection of spasmolytic agents. Noteworthy is the extremely anxious behaviour of the patients. Due to the unbearable pain, they scream, become restless, adduct the legs to the abdomen, assume the knee-elbow position.

Clinical picture

- Nausea and vomiting appear.
- More than one half of the patients are registered with 1-2 episodes of loose stool resulting from the spasm of intestinal loops.
- In 1/4 of the patients, immediate retainment of stool and gas is noted.

Clinical picture

- Severe pallor of skin upon examination. Patients with decompensated heart defects have intensified cyanosis.
- Occlusion of the trunk of the superior mesenteric artery induces an increase of arterial blood pressure by 60-80 mmHg (Blinov's sign). The heart rate may be slowed.
- The tongue remains moist and the abdomen remains soft and absolutely painless.
- The number of leucocytes increases to 10-12x10^9/l.

Clinical picture

- At the ***infarction stage*** (usually beginning 6-12 hours after the disease onset and lasting for 12-24 hours), the pain somewhat decreases due to the necrotic changes in the intestinal wall and death of pain receptors.
- The patients' behaviour becomes calmer. Mild euphoria appears that manifests through inadequate behaviour of the patients due to the intoxication.
- Arterial blood pressure normalises and the heart rate, on the contrary, increases.
- The number of leucocytes increases to 20-40x10^9/l.

Clinical picture

- At the ***peritonitis stage*** (beginning 18-36 hours after the moment of arterial occlusion), the pain intensifies when changing the body position, coughing, palpation, which is associated with development of inflammatory changes in the abdominal cavity.
- The condition of patients deteriorates drastically due to the pronounced endotoxicosis, electrolyte balance disturbance and development of metabolic acidosis.
- The patients become adynamic, some of them become delusional.

Clinical picture

- A peculiarity is the later appearance of muscular tension and Shchetkin-Blumberg sign. As a rule, they initially appear in the lower parts of the abdomen.
- A characteristic feature of the ischaemic stage is the localisation of pain in the epigastrium or around the whole abdomen. Subsequently, the pain concentrates in the area of the impaired part of the intestine. At the peritonitis stage, pain around the whole abdomen become predominant.

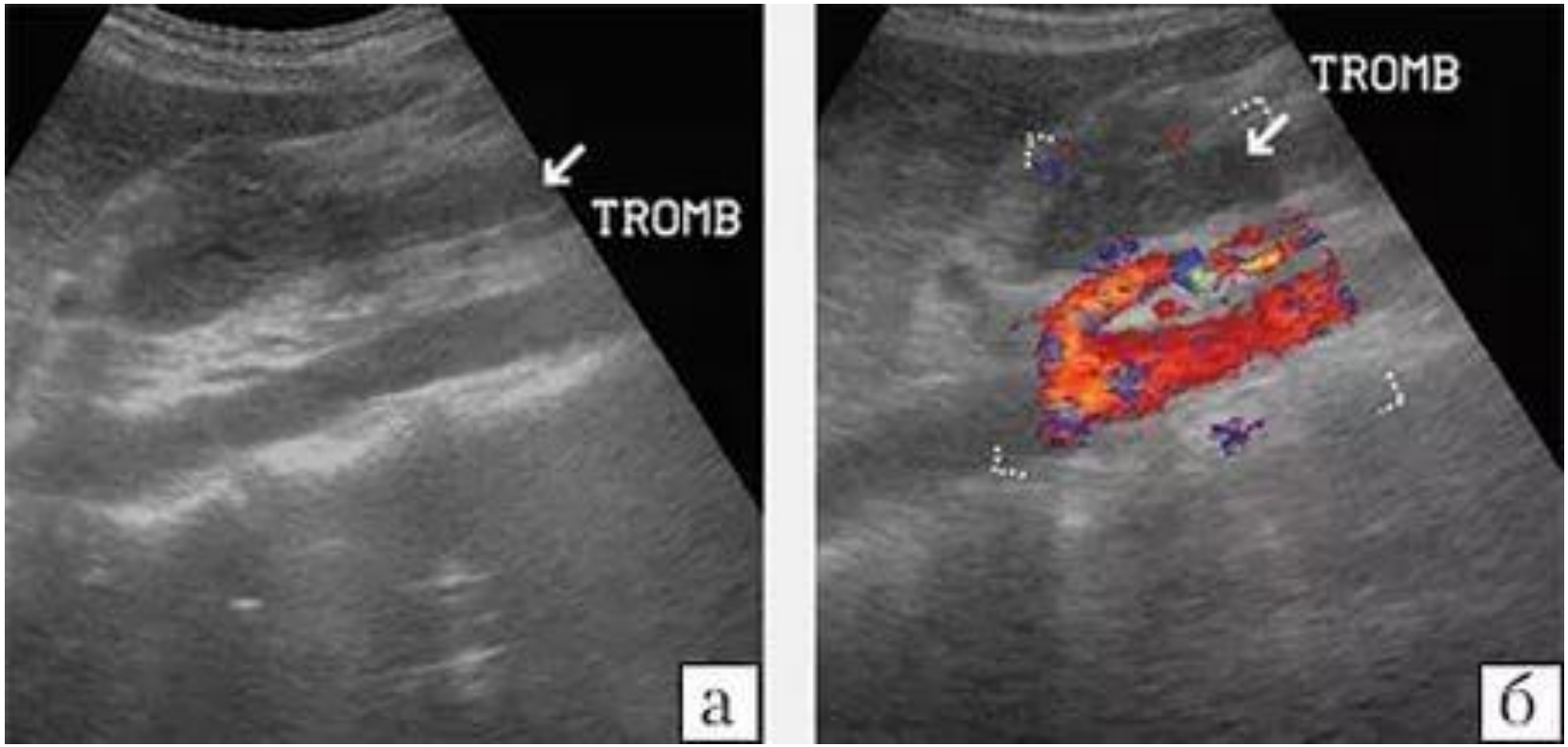
Clinical picture

- “ischaemic emptying of the intestine”
- appearance of blood in the faeces
- a fairly characteristic feature of the ischaemic stage is the absence of pain upon deep palpation of the abdomen
- rectal examination makes it possible to reveal blood-tinged discharge

Diagnosis

- Angiography
- Laparoscopy
- Diagnostic laparotomy
- Ultrasound

Diagnosis



Diagnosis

Diagnosis

Surgical treatment

- Surgical intervention must address the following aims:
  - restoration of mesenteric circulation;
  - removal of destructed parts of the intestine;
  - control of peritonitis

Surgical treatment

- Main stages:
  - surgical access,
  - revision of the intestine and evaluation of its viability,
  - revision of the main mesenteric vessels,
  - restoration of mesenteric circulation,
  - intestinal resection if indicated,
  - drainage and sanitation of the abdominal cavity

Surgical treatment

- Early and targeted (programmed) relaparotomy is performed for control of the abdominal condition.
- The term of relaparotomy is from 24 to 48 hours.

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Thank you for your attention