

STANDARDIZATION OF THE THERAPEUTIC DIAGNOSTIC APPROACH FOR COMBINED CLOSED INTESTINAL INJURY

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Abstract: The aim of the study was to standardize the treatment and diagnostic approach for combined blunt intestinal injury in order to improve treatment outcomes.

Key words: closed abdominal trauma; tactics of multi-stage surgical treatment; severe concomitant injury; damage to the small intestine; colon damage; delayed anastomosis.

СТАНДАРТИЗАЦИЯ ЛЕЧЕБНО-ДИАГНОСТИЧЕСКОГО ПОДХОДА ПРИ КОМБИНИРОВАННОМ ЗАКРЫТОМ ПОРАЖЕНИИ КИШЕЧНИКА

Аннотация: Цель исследования — стандартизация лечебно-диагностического подхода при сочетанной тупой травме кишечника с целью улучшения результатов лечения.

Ключевые слова: закрытая травма живота; тактика многоэтапного хирургического лечения; тяжелая сочетанная травма; поражение тонкой кишки; повреждение толстой кишки; отсроченный анастомоз.

INTRODUCTION

The small intestine (SIC) is damaged more often than other hollow abdominal organs (BP) (16.3–37.8%), which is due to its considerable length and exposure [7, 22, 30]. Damage to the colon (OC) is observed less frequently due to a more favorable anatomical location - in 10-17% of victims with closed damage to the organs of the BP and retroperitoneal space (RP) [14, 16, 22, 23, 29], and damage to the rectum (PC) - in 1-5%. Most of the victims (60-87.9%) are men of working age [7, 14-17, 19, 30]. In 70-90% of cases, it is combined (CT) (with closed TBI (35.6% / OK), rib fractures (35.6% / OK; 0.9% / SIC), pelvis (36.7% / OK; 3.2% / SIC ; 6.6% / PC), lower extremities (41.1% / OK) [16]) or multiple (with liver (32.9-35.2% / OK; 3, 2-32% / SIC), spleen (21.6-26.8% / OK; 12.9-20% / SIC), pancreas (8.3%), bladder (6.0%) [7, 16, 30]) trauma.

MATERIALS AND METHODS

The transverse OC is damaged in 45-65%, the sigmoid colon - in 11.5%, the descending OC - in 8.7% of cases, less often - the caecum and ascending OC (7.4% each) [14, 16]. Closed injuries occur when a blunt object is struck in the abdomen (40.6% [23, 30]; 4.3-7.2% / PC), compression between two massive objects (4.3-5.9% / PC) [14] or as a result of traffic accidents (33.8% [4, 5, 7, 23, 29, 30]; 62.5% / OK; 24.2-63.1% / PC [16]), falls from a height (16.6% [4, 7, 29, 30]; 9.2% / TnC ; 5.4-14.1% / PC - when falling on the perineum) and are expressed in the formation of mesenteric, intramural hematomas, ruptures, crushing of the intestine, its separation from the mesentery [23]. The mesentery is damaged in 22% of patients with closed abdominal trauma (BTA), in 72% it is combined with intestinal trauma [7]. Ischemic disorders in the intestinal wall can be associated not only with vascular rupture, but also with thrombosis, which can lead to its gradual necrosis and the development of peritonitis over several days [29]. Large mesenteric hematomas may spread into the PO. Separation of the intestine from the mesentery leads to intra-abdominal bleeding. Significant intramural hemorrhages can lead to secondary necrosis and perforation [29]. Complete intraperitoneal ruptures of the PC (37-44.5%) are complicated by fecal

peritonitis. With an extraperitoneal complete rupture (55.5-57.5%), its contents enter the surrounding pelvic tissue, causing putrefactive phlegmon of the small pelvis, in 5.5-6% of cases there is a combination of extra- and intraperitoneal ruptures. Difficulties in recognizing closed intestinal injuries are exacerbated by the fact that patients are often admitted to the hospital in a state of shock, sometimes unconscious, with ST, intoxicated. For this purpose, we have developed and applied the following treatment -diagnostic algorithm. With a relatively stable condition of the patient ($BP_{sys} > 90$ mm Hg, $HR < 120/min$, $RR < 30/min$, absence of hemorrhagic shock), a comprehensive examination begins with emergency multislice computed tomography (CT) of the abdomen (with CT and other damaged areas) (level of evidence - A, strength of recommendation - 1; A1) [1, 2, 8, 16]. If damage to the mesenteric vessels is suspected and / or the presence of free fluid (SF) in the BP, retroperitoneal hematoma (PH) and the absence of free gas (SH) in the BP / RP, the examination is supplemented with angiocontrast to identify the source of possible bleeding [7, 13] . Characteristic signs of damage to the intestine, its mesentery are SF in PD (68.8%), thickening of the wall, SG in PD / PD (50% / MC [29]), dilatation of the intestine, decreased peristalsis, formation of bands in the fatty tissue of the mesentery, increased echogenicity mesenteric fat, mesenteric hematoma or clot adjacent to the intestinal wall, exit of contrast from the intestinal lumen (19%/CR [29]) or vessel [7, 13, 29]. The sensitivity and specificity of three-contrast (oral, rectal, and intravenous) CT are 90–97 and 98%, respectively [13, 22, 29]. CT with proctography in the diagnosis of PC injury is more informative than conventional radiopaque proctography , because 3D reconstruction of the image, clear visualization of the level and localization of the rupture (leakage of contrast into the surrounding tissue/BP), assessment of damage to adjacent structures, and detection of purulent foci are possible [13]. In the case of extravasation of a contrast agent (ECM) into the LA/ZP/intestinal mesentery (unstable hematoma), endovascular embolization (EE) of the damaged vessel is performed [2, 7, 11]. Ghelfi Jet _ al ., 2016 [11] reported EE in 6 patients with PTZ and bleeding from the superior mesenteric artery. One patient developed intestinal ischemia, which required resection. In case of ineffective EE and the amount of SF in the BP > 500 ml/growth of retroperitoneal/mesenteric hematoma, an emergency laparotomy (LT) is performed, bleeding is stopped, and intestinal viability is assessed [2]. In case of ineffective EE and the amount of SF in the BP < 500 ml, laparoscopy (LS), hemostasis, sanitation, and drainage of the BP are performed [16]. With LS, intramural hematomas, deserialized parts of the intestinal walls and mesenteric lesions, which are difficult to diagnose in the early stages, can be detected ; The diagnostic value is 93.8-99% [1, 16, 22]. With an unclear source of ongoing bleeding, ineffective hemostasis, or detection of intestinal rupture, conversion is performed [7]. With effective EE and the absence of hemoperitoneum ("stabilization" of unstable retroperitoneal/mesenteric hematoma), stable hemodynamics, dynamic monitoring is performed in the ICU (DN). With effective EE and the amount of SF in the BP > 500 ml (stopped intra-abdominal bleeding with stable hemodynamics), drugs are performed for sanitation and drainage of the BP. With effective EE and the amount of SF in the BP < 500 ml (stopped minor intra-abdominal bleeding with stable hemodynamics), the absence of pneumoperitoneum and pneumorethorperitoneum and a "calm" abdomen (no signs of peritonitis, intestinal obstruction, tension of the anterior abdominal wall), DN is performed. With a "restless" abdomen, a diagnostic peritoneal lavage (DPL) (A1) / minilaparotomy (with multiple postoperative scars) [1, 2, 8, 16], and if appropriate indications are identified (there is also a rupture of a hollow organ without the release of SG into the BP/BP: bile, intestinal contents, particles food, cloudy exudate with fibrin flakes, fecal odor; > 500 leukocytes / ml), alkaline phosphatase level $>$

10 IU / l (produced by the mucous membrane of the small and large intestine; specificity for intestinal damage - 99.8%, sensitivity - 94.7 %) or amylase > 75 IU/l) – LT [2, 7, 16]. In the absence of EKV in the BP/ZP/intestinal mesentery, SG in the BP/ZP, hemoperitoneum (stable hematoma), DN is performed [7]. In the absence of EKV in BP / BP / mesentery of the intestine and SG in BP / BP, SF ≤ 500 ml, DPL is performed to clarify its nature (in hemodynamically stable patients, CT and DPL are complementary diagnostic methods (A1) [8]) and - if appropriate indications are detected (rupture of a hollow organ without SG exit into the BP/BP) – RT [1, 8]. In the absence of ECV in the BP/ST/intestinal mesentery, the absence of SG in the BP/ST, SF in the BP > 500 ml, LS is performed [18] to search for a possible rupture of the hollow organ (without SG release), sanitation, drainage of the BP, and conversion according to indications. If signs of damage to a hollow organ are detected on CT scan (SH in PD/LC, extraluminal contrast), RT is performed in the clinic of peritonitis [2, 8]. In case of questionable/negative CT results and a "calm" abdomen, DN is performed (A1) and repeated CT scan 12-24 hours after the injury (A2) [2, 8]. With a "restless" stomach - DPL, according to indications - LT. In case of hemodynamic instability of the patient (BP_{syst} < 90 mm Hg, heart rate > 120/min.), RR > 30/min., hemorrhagic shock clinic, a comprehensive examination in the anti-shock operating room begins with ultrasound of the OBP and GP (A1) (FAST protocol) and survey radiography of the OBP (ROBP) (with CT radiography of the corresponding areas); with ongoing intra-abdominal (with SF > 500 ml) or retroperitoneal bleeding (signs of blood flow in the MH), urgent RT (A1), MH revision is performed [1, 2, 7, 14, 16, 18, 22, 30]. Using the FAST protocol, it is possible to establish the presence of intraparietal or MH, pneumorethroperitoneum in case of damage to the retroperitoneal TC, and in case of intraperitoneal rupture, SF (A1) and SG in the BP [1, 8, 10, 22]. Informative value of ultrasound in intestinal trauma is 67-87.5% [1, 10, 16, 22, 30]. The method allows detecting the presence of SF up to 200 ml with an accuracy of 94.3%, from 200 to 500 - 98.5% [7]. Sonography is able to detect pneumoperitoneum with a volume of 1-5 ml in the form of a thin echogenic line below the muscle layer and preperitoneal tissue of the abdominal wall. Scanning of the liver area allows differentiation between intraperitoneal and intraluminal intestinal gas, as in this zone it is extraluminal. Pneumoperitoneum is characterized by a "shift phenomenon" from the anterior to lateral regions of the liver when turning from the back to the left side [8] in contrast to intraluminal /pulmonary gas. With pneumorethroperitoneum, there is also no "displacement phenomenon", gas is detected around the kidney, which causes the appearance of its nebula, veiling, a sign of the renal ring appears - hyperechogenicity extrarenal tissue; between the aorta and the inferior vena cava - a type of "disappearance of large vessels"; around the head of the pancreas and behind the gallbladder. When SH is detected in the BP/ZP, RT is performed [2, 8, 10]. ROBP with complete intestinal rupture allows to detect SH in PD [1, 8, 10, 16, 22] RT is performed. With retroperitoneal rupture, retroperitoneal emphysema is determined in the form of enlightenment along the kidney and/or MH in the form of increased shadow around the clear contour of the kidney, high standing of the dome of the diaphragm, and veiling of the outer edge of the psoas muscle [13]. Informativeness of ROBP is up to 25% in the presence of SH in BP with damage to TnC, 40-67% - to the large intestine (TIC), SF - 31.3% [8, 10, 16, 22]. In the diagnosis of PC injuries, X-ray contrast is additionally used. proctography with water-soluble contrast, sigmoidoscopy and transrectal ultrasound, but after stabilization of the patient, more often at stage II of the damage control " (DC). In case of hemodynamic instability of the patient and the presence of fluid in the BP < 500 ml / uninformative ultrasound / in the absence of SF / SG in the BP / BP, but clinically "restless" abdomen, DPL (A1) is performed [1, 7, 10, 16], according to indications

- LT (A1) [7, 8, 10, 16]. DPL is considered indispensable in severe TS with impaired consciousness, unstable hemodynamics, and increases the accuracy of preoperative diagnosis up to 75.5-95% [10, 16]. In the absence of fluid and gas in the BP/ZP, ultrasound signs of blood flow in the MH, and a "calm" abdomen, DN is performed [10]. Treatment. In case of intestinal damage, emergency surgery is the only rational method of treatment (A1) [1, 2, 8, 10, 23]. The vast majority of patients are admitted in a state of shock (up to 80 (TnC) - 97% (TnC) with TS [16]), anti-shock measures are carried out in parallel with diagnostic ones. The wide median laparotomy (B1) is the most appropriate [1, 14, 21, 23]. The volume of surgical intervention is determined only after hemostasis and a thorough revision of all organs of the PD [29]. The presence of MH in the projection of the ascending/descending OC is an indication for examination of their retroperitoneal sections [21, 29]. Difficulties in examining the hepatic and splenic flexures should be eliminated [21]. Mesenteric hematomas adjacent to the intestinal wall should be carefully opened and examined [7]. When mobilizing the mesenteric margin, the TLC wall should not be extensively skeletonized ; even the smallest mesenteric vessels and fatty suspensions should be spared [7, 21]. Failure to comply with these rules leads to malnutrition of the TLC and possible failure of the sutures. But insufficient mobilization of the wall can lead to stitching of heterogeneous tissues and failure of the sutures. Other non-spread mesenteric hematomas should be assessed for their stability throughout the operation. When bleeding from the vessels of the mesentery, clamps are applied to their ends, followed by ligation or the imposition of an eight-shaped suture. Defects in the mesentery are sutured later [7]. Hemostasis in bleeding from the root of the mesentery requires special care due to the possibility of impaired blood supply to the intestine. With an unfavorable prognosis of combined closed shockogenic abdominal injuries with intestinal damage, in conditions of widespread purulent / fecal peritonitis in the toxic or terminal phase and abdominal sepsis [20], in an extremely serious condition, unstable hemodynamics against the background of inotropic and infusion therapy and the presence of a "deadly triad" (hypothermia, acidosis and coagulopathy) resort to DC tactics (B1) [1, 8, 15, 16, 23]. Stage I of DC tactics is primary emergency surgery in a reduced volume (≤ 90 min): hemostasis, elimination of hollow organs damage without intestinal stomas/anastomoses (B2) [1, 2, 8, 15, 16, 23]. Subserous hematomas and incomplete ruptures (I AAST) after revision and drainage are immersed with serous-muscular interrupted sutures with a non-absorbable thread in a direction transverse to the course of the intestine. In the presence of one or several tears at a considerable distance from each other with a size of $< 1/2$ of the diameter of the intestine (II AAST), suturing (A1) [19, 23, 28, 29] is performed in the transverse direction with a continuous single-row serous-muscular-submucosal suture (ONSH) [2, 6, 16, 18, 23, 27] with an absorbable suture on an atraumatic needle after economical excision of the edges imbedded with blood, which has proven advantages over a two-row suture. The chemical and enzymatic aggressiveness of the intestinal contents decreases in the distal direction, but the virulence of the bacterial flora increases, so it is more rational to start suturing defects from the distal sections. With significant damage (the presence of > 2 tears in the area of 10 cm or 2 tears at a distance of ≤ 5 cm from each other, with wall defects $> 1/2$ of the circumference without intersection (III AAST), penetrating defects, with complete section of the intestine (IV AAST), extensive crushing of the wall, transverse rupture of the mesentery (longitudinal to the axis of the intestine) for > 5 (TNC)/10 cm (OK) with ischemia/necrosis of the intestinal wall (VAAST)) resection is performed [2, 12, 16, 19, 26, 28, 29] with closing the ends with a purse-string suture / linear stapler [16] / clamping, the distal and proximal sections of the intestine are immersed in the BP (B2) [1, 24], nasogastrintestinal intubation (NII) is

performed with a double-lumen Miller-Abbot probe of the proximal area (B2) [1, 6, 18, 22, 23, 27], stop bleeding, sanitation and drainage of the BP (A1) [1], insertion of a gas outlet tube (A1) [1] and divulsion of the anus (in case of injury TIK) [22] . Chamieh Jet _ al ., 2018 [4] believe that in such an intermittent state the intestine can be in the BP for up to 3 days, until a pronounced edema of the wall begins, but the optimal time for anastomosis is 12-48 hours. If it is impossible to stabilize the patient within the specified timeframe, preference is given to a stoma at the 3rd stage of DC. Indications for TNC intubation [1, 8, 18]: multiple injuries of the intestine, mesentery; dilatation of the small intestine more than 4-5 cm, peristalsis only in response to irritation; the presence in the small intestine of a large amount of sequestered fluid, extensive intramural hematomas; widespread fecal / purulent peritonitis with fibrin, multiple abscesses; infected hemoperitoneum , extensive MH; decompression of the area of the superimposed anastomosis with paresis / widespread peritonitis; extensive adhesive process in BP. Contraindications to RI (B2) [1, 8]: anatomical features (narrowing or curvature of the nasal passages, organic disease of the upper gastrointestinal tract, esophageal varices, esophageal stricture, deformity of the pyloroduodenal zone in the region of the Treitz ligament , extensive adhesive process in the upper floor of the PD , infiltration of the intestinal wall, severe respiratory / heart failure. If the research institute is not possible, an intestinal probe is carried out through a gastrostomy (according to Yu.M. Dederer), cecostomy (according to G. Sheide) or a suspended ileostomy (retrograde drainage 40 cm from the ileocecal angle according to I.D. Zhitnyuk) [1]. With the help of research institutes, the following are performed: decompression, prevention of intestinal paresis and suture failure, detoxification therapy (intestinal dialysis / enterosorption), correction of the intra-intestinal environment through a tube, drug effects on the mucous membrane, enteral nutrition, creation of a “framework” for TNC and prevention of adhesive obstruction; restoration of intestinal motility. Anastomosis after resection is not superimposed (delayed anastomosis tactics) (B2) [1, 2, 23, 26]. In the absence of indications for DC tactics, the imposition of a primary anastomosis after TNC resection is acceptable in the absence of widespread purulent peritonitis (in the first 6 hours), intra-abdominal hypertension syndrome, and also after high resection of the jejunum, when the risk of a high small bowel fistula is higher than the risk of anastomotic suture failure (C1) [23]. In the absence of indications for the tactics of DC / widespread fecal / purulent peritonitis (up to 2 hours from the moment of injury), intra-abdominal abscesses / dense stools in the intestinal lumen / extensive retroperitoneal or mesenteric hematomas [28] / endotoxiosis , respiratory distress syndrome, DIC , the need for transfusion of more than 6 doses of erythrocyte mass [24, 29], severe comorbidity, intra-abdominal hypertension syndrome [20] and extensive damage to the right half of the OK, right-sided hemicolectomy , ileotransverse anastomosis is performed [16]; transverse OK-resection with transverse transversal anastomosis ; descending OK / sigmoid colon - left-sided hemicolectomy / obstructive resection with anastomosis. To strengthen the seam line, it is possible to use plastic materials (Tachocomb , biological adhesive preparations). In the presence of these risk factors, the anastomosis is not superimposed (the risk of anastomosis failure in the presence of severe concomitant pathology and transfusion of more than 6 doses of erythrocyte mass is 42% versus 3-4% in the absence of these factors), stomas are removed (C1) [8, 23, 24, 28, 29]. PC injury: bleeding arrest, tamponade of the pelvic cavity, transverse suturing of intraperitoneal CNS ruptures, transanal drainage (A1) [1, 23, 25]. Incomplete extraperitoneal ruptures of the PC without infection of pararectal tissue are conservatively treated: stool retention up to 5 days, slag-free diet, microclysters with antiseptics, antibiotic therapy. With the ineffectiveness of treatment and the development of a purulent process

in the pararectal tissue, an operation is performed at the 3rd stage. In case of damage to the sphincter apparatus - hemostasis. Next, a temporary closure of the laparotomic wound (VAC-laparostomy) is performed (B1) [1, 23]. Stage II - Damage Control Resuscitation - stabilization of the vital functions of the body, identification of damage [15]. Stage III - repeated planned reconstructive surgery in 24-96 hours with a thorough revision of all injuries [15, 25], as well as programmed sanitation relaparotomy [1, 8, 20, 23]. With a significant narrowing of the intestinal lumen after its suturing at the 1st stage, necrosis after ligation of the mesenteric vessels, resection is performed [19, 23]. After bowel resection using delayed anastomosis tactics - CNS anastomosis / stapler. There is no difference in the incidence of failure between manual and machine anastomosis, including those with different degrees of intestinal damage according to AAST [3, 12, 19, 23, 26]. The technique of manual anastomosis includes the imposition of a single-row serous-muscular-submucosal (70% of the mechanical load is borne by the submucosal layer) continuous (when applying an interrupted suture, the mass of the thread left in the tissues is 4 times greater, the response of the tissues is the same number) suture with absorbable monofilament (the frequency of strictures when applying an anastomosis with a monofilament thread < 0.7%, with a polyfilament thread - 9.5%) with threads [12, 16] or a two-row anastomosis (with a continuous internal suture with absorbable sutures and an external suture according to Lambert non-absorbable thread). In a two-row intestinal anastomosis, the frequency of stenosis is 8-10 times higher, the speed of passage of the food bolus is 6 times lower, and the incidence of leakage is the same as in a single-row one [3]. Dibirov M.D. et al., 2018 [9] analyzed the results of 76 compression anastomoses using nickel -titanium shape memory rings against the background of widespread peritonitis, including DC tactics. Anastomosis failure was 2.6%, the authors note their reliability, tightness, technical simplicity of application, exclusion of bleeding from this area, severe anastomosis and the formation of strictures in the long term [9]. After resection of the ileum, if the terminal section is ≤ 10 cm, an end-to-side ileotransverse anastomosis is performed, as the probability of ileoileoanastomosis failure is high due to poor blood supply (critical vascular point of Griffiths). The outlet end of the ileum is sutured tightly. After suturing the antimesenteric edge of the intraperitoneally located sections of the OC and doubting the reliability of suturing, extraperitonization of the intestinal area with a sutured defect is possible [23]. After resection of the OC, the reassessment of the viability of the resected areas and the imposition of an intestinal anastomosis or the formation of a colostomy (C1) are performed [2, 4, 17, 24, 27, 29]. Right-sided hemicolectomy is followed by ileotransverse anastomosis + NI/terminal ileostomy \pm transversostomy [14, 16, 22]. Rupture of the caecum in doubtful cases is transferred to the cecostomy. In case of damage to the transverse OK and the threat of insolvency at the site of suturing, a proximal loop transversostomy is performed; after resection – anastomosis/ proximal \pm distal single-barrel colostomy [4]. In case of damage to the descending colon / sigmoid colon and the threat of leakage at the site of suturing, a loop transversostomy is performed (presence of a preventive stoma does not reduce the incidence of leakage, but reduces the severity of clinical manifestations and increases the success of conservative treatment of leakage) [16, 25]; after left-sided hemicolectomy / obstructive resection - anastomosis / end double-barrel colostomy (Mikulich-type operations) / proximal single-barrel colostomy and suturing of the distal section (Hartmann-type operation) [16, 22]. Delayed anastomosis does not increase the rate of colostomy removal, complications and mortality [1, 6, 23, 27], failure is 12-28% [4, 24, 27]. Sharpe JP and al., 2017 [24] in their review of the results of delayed OC anastomoses after injury III VAAST concluded that in the absence of severe comorbidity and the need for transfusion of more than 6

doses of red blood cells, the risk of their failure is reduced to 4 % . End-to-end anastomosis is more reliable in terms of blood supply and physiological, it takes less time to apply. If the diameters of the afferent and efferent loops do not match, side-to-side anastomosis is preferred [4, 19]. The feeding vessels are ligated between the intestine and the arcade closest to it. When anastomosis is applied to the TLC , decompression is performed by divulsion of the anus according to Recamier-Subbotin and the insertion of a colonic probe through the PC behind the suture line (A1) [1, 16]. Colostomy is preferable for severe peritonitis with intra-abdominal abscesses, marked edema of the intestinal wall, metabolic acidosis, persistence of coagulopathy and hypothermia, and an increase in intra-abdominal pressure above 25 mm Hg. Art. [1, 2, 4, 24, 28]. Cheng Vet _ al ., 2020 [5] analyzed the results of TC resections after PTZ in 13,949 patients and concluded that stoma removal is significantly associated with lower mortality in sigmoid colon injury and a large number of repeated unplanned relaparotomies after transverse TC injury. With closed injuries of the OK, the removal of the colostomy is associated with a longer period of mechanical ventilation, stay in the ICU and inpatient treatment [4, 5, 17]. Lasinski AM and al ., 2018 [17], in turn, showed that lethality in delayed anastomosis does not differ from that in stoma removal. In case of damage to the PC after suturing at the 1st stage and the threat of insolvency, a double-barrel sigmoidstoma according to Meidl , transanal drainage (A1) is performed [1, 23, 25]. With multiple intraperitoneal ruptures of the PC/ rectosigmoid region, ruptures > 1/2 of the circle, crushing with necrosis and complete detachment of the intestine - resection of the site and removal of the adductor end in the form of a single-barreled unnatural anus (B2), the discharge end is muffled (by the type of Hartmann's operation) [1, 19, 23].

RESULTS

A clear treatment and diagnostic algorithm has been developed for combined closed intestinal injury, based on the severity of the patient, a detailed description of the phased surgical treatment based on the principles of evidence-based medicine is given.

In extraperitoneal ruptures, along with a double-barreled sigmoidstoma , pararectal tissue is drained through the perineum with excision of necrotic tissues, and the intestinal wall defect is sutured from the side of the lumen with single-row interrupted sutures through all layers [19, 23]. In case of damage to the sphincter apparatus, the formation of a colostomy with subsequent delayed recovery. The most frequent complications of intestinal injuries are suture failure, acute intestinal obstruction, narrowing of the anastomosis with impaired passage, intra-abdominal/retroperitoneal abscesses/phlegmon, and peritonitis [4, 5, 19, 25]. Causes of anastomotic failure [1, 3, 4, 5, 12]: errors in the overlay technique - bleeding in the anastomosis area with the formation of a hematoma, excessive tissue tension, additional punctures of the intestinal wall, disproportionate sutured areas, large stitch pitch, wrong choice of resection level and anastomosing surfaces , inadequate choice of suture material; arterial hypotension during surgery [1] with a decrease in pressure by more than 40 mm Hg. Art. for ≥ 7 minutes, use of vasopressors , hypoproteinemia [1] (total protein < 55 g/l), immunodeficiency (HIV, hepatitis, immunosuppressant therapy), blood loss (decreased hemoglobin < 95 g/l, need for transfusion of more than 6 doses of red blood cells masses), mesenteric ischemia, severe peritonitis; violations in the operation of the stapler; postoperative intestinal paresis.

DISCUSSION

Mahmood I and al., 2020 [19] analyzed postoperative complications in 160 patients with closed intestinal injury and concluded that an independent predictor of their development (anastomotic failure, wound complications, intra-abdominal abscesses) is a high level of blood

serum lactate, regardless of the type of anastomosis and method its imposition (manual/hardware). Surgical outcomes. Intestinal ST without the use of DC tactics is characterized by a high incidence of postoperative complications - 20.4-67.1% / TIC, of which intra-abdominal - 50-72% / OK, 3.6-27.7% / PC, mainly due to suture failure (up to 69% / TIK, 12.5% / SIC) [3, 12, 16, 30]. Abdominal sepsis is observed in 4-6.35%, suppuration of the postoperative wound - in 6-33% [16]. If DC tactics are not used, lethality in TnC TS after surgical interventions performed within 6 hours after injury is 20%; from 6 to 8 hours - 40%, after 12 hours - 52% [30]; with combined damage to TIC - 39.5-59% [16]. The main cause of death is peritonitis due to late admission, anastomotic suture failure, and ST. With DC tactics, lethality from intestinal TS decreases to 4.9-16.9% [4, 5, 26, 27], mainly due to a decrease in the aggressiveness of the primary intervention and the percentage of failure of delayed anastomoses.

CONCLUSION

Standardization of the treatment and diagnostic approach in case of concomitant closed intestinal injury based on the severity of the patient's condition, hemodynamic stability, localization and size of injuries, degree of infection of the abdominal cavity can improve the results of diagnosis and treatment of this category of patients. At the 3rd stage, DC tactics in severe combined intestinal injury reduce or eliminate the frequency of suture failure and contribute to a decrease in mortality.

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