https://doi.org/10.22416/1382-4376-2023-33-4-58-69
UDC 616.341-007.253-08

Two-Stage Treatment of Enterocutaneous Fistulas

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Aim: to determine the most efficient treatment of enterocutaneous fistulas.
Materials and methods. Eighty-eight patients with intestinal fistulas underwent a two-stage treatment, including: the first stage — multicomponent therapy, the second stage — reconstructive surgery. Enterocutaneous fistulas were diagnosed in 61 patients, enteroatmospheric fistulas — in 26 patients, and combined fistula (enterocutaneous and enteroatmospheric) — in 1 patient.
Results. All 88 patients underwent reconstructive surgery after the multicomponent therapy. Resection of the intestine with a fistula with the formation of an entero-entero anastomosis was performed in 72 (81.8 %) patients; marginal resection of the intestine with a fistula, followed by suturing of the defect — in 7 (8.0 %); resection of the intestine with fistulas in combination with excision and suturing of the fistula — in 5 (5.7 %); an operation aimed at disabling the fistula from the passage of intestinal contents — in 3 (3.4 %); resection of the intestine with a fistula in combination with fistula exclusion — in 1 (1.1 %) patient. Postoperative complications in the group of patients with enteroatmospheric fistulas occurred in 13 cases, in the group with enterocutaneous fistulas — in 25 patients. Three (3.4 %) patients with enterocutaneous fistulas died from complications unrelated to the underlying disease and surgical interventions.
Conclusion. Two-stage treatment including multicomponent therapy (nutritional support, infection generalization control, local wound treatment) and reconstructive surgery allowed to reduce mortality rates to 3.4 %, which proves the effectiveness of this method.
Keywords: enterocutaneous fistula, enteroatmospheric fistula, two-stage treatment, nutritional support, nutritional deficiency, surgical treatment
Conflict of interest: the authors declare that there is no conflict of interest.

For citation: Struchkov V.Yu., Berelavichus S.V., Ahtanin E.A., Gorin D.S., Burmistrov A.I., Dvukhzhilov M.V., Goev A.A., Markov P.V., Kriger A.G. Two-Stage Treatment of Enterocutaneous Fistulas. Russian Journal of Gastroenterology, Hepatology, Coloproctology. 2023;33(4):58–69. https://doi. org/10.22416/1382-4376-2023-33-4-58-69

Двухэтапное лечение тонкокишечных свищей

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Цель: определение оптимальной тактики лечения больных тонкокишечными свищами (ТКС).
Материалы и методы. Проведено двухэтапное лечение 88 больным тонкокишечными свищами: первый этап — консервативная поликомпонентная терапия; второй этап — реконструктивное хирургическое вмешательство. Сформированные тонкокишечные свищи были у 61 пациента, несформированные — у 26, комбинированный свищ (сформированный и несформированный) — у 1 больного.

Результаты. Всем 88 пациентам после проведения консервативного этапа лечения были выполнены реконструктивные хирургические вмешательства. Резекция кишки со свищом с формированием межкишечного анастомоза выполнена 72 (81,8 %) больным; краевая резекция кишки, несущей свищ, с последующим ушиванием дефекта — 7 (8,0 %); резекция кишки со свищами в комбинации с иссечением и ушиванием свища — 5 (5,7 %); операция, направленная на отключение свища из пассажа кишечного содержимого — 3 (3,4 %); резекция участка кишки со свищом в комбинации с отключением свища — 1 (1,1 %) пациенту. Послеоперационные осложнения у пациентов с несформированными тонкокишечными свищами возникли у 13 человек, в группе со сформированными ТКС — у 25 пациентов. Трое (3,4 %) больных ТКС умерли от осложнений, не связанных с основным заболеванием и выполненными оперативными вмешательствами.
Выводы. Двухэтапное лечение, включающее в себя поликомпонентную терапию и реконструктивное хирургическое вмешательство, позволило снизить показатели летальности до 3,4 %, что доказывает эффективность данного метода.
Ключевые слова: кишечный свищ, тонкокишечный свищ, двухэтапное лечение, нутритивная поддержка, нутритивная недостаточность, хирургическое лечение
Конфликт интересов: авторы заявляют об отсутствии конфликта интересов.

Для цитирования: Стручков В.Ю., Берелавичус С.В., Ахтанин Е.А., Горин Д.С., Бурмистров А.И., Двухжилов М.В., Гоев А.А., Марков П.В., Кригер А.Г. Двухэтапное лечение тонкокишечных свищей. Российский журнал гастроэнтерологии, гепатологии, колопроктологии. 2023;33(4):58–69. https://doi.org/10.22416/1382-4376-2023-33-4-58-69

Introduction

Intestinal fistula (IF) is a connection between the intestinal lumen and the external environment or adjacent tissues and organs [1]. The IF has a canal of various length and width, opening into the skin, into a wound of the abdominal wall, a tubular organ, or ending blindly in the soft tissues. As a rule, IF occurs in the early postoperative period and is a severe complication that becomes a serious problem for the patient and the doctor.

The rapid development of surgery over the past two decades has contributed to an increase in the incidence of enteric fistulas. This is associated with an increase in the number of abdominal and pelvic operations [2, 3].

Treatment of patients with IF is associated with the frequent development of life-threatening complications, such as sepsis and septic shock, syndrome of enteric insufficiency, severe electrolyte imbalance, which lead to high mortality rates (35–75 % according to domestic authors, which corresponds to data of foreign colleagues) [2–6]. This issue is particularly relevant in the presence of enteroatmospheric fistulas (EAFs), as well as in high enterocutaneous fistulas (ECFs) with high output (intestinal content loss of more than 500 ml per day). In the absence of adequate conservative therapy, malnutrition and immunological disorders quickly develop, which further contributes to the progression of sepsis and the development of multiple organ dysfunction syndrome [7, 8]. Surgical intervention performed during this period, without proper preparation, not only does not improve the condition of the patient, it can be fatal and lead to a rapid deterioration and death of the patient.

In the current literature, there is no unified concept of perioperative management of patients with ECFs based on pathophysiological processes of the disease. There is no detailed description of surgical techniques and tactical decisions during surgical interventions.

This article describes the developed method of two-stage treatment of patients with enterocutaneous and enteroatmospheric fistulas.

Materials and methods

In the period from 2008 to 2020, 88 patients with enterocutaneous fistulas from different regions of Russia were treated at the Department of Abdominal Surgery at the National Medical Research Center of Surgery named after A. Vishnevsky. Among them there were 50 (56.8 %) men and 38 (43.2 %) women. The age of the patients ranged from 18 to 84 years (median — 51 years old). Prior to admission to the Center, patients underwent from 1 to 14 operations on abdominal organs (mean number of surgeries — 3.7).

All patients had ECFs, of which combined (enterocutaneous and colonic) fistulas were diagnosed in 6 (6.8 %) patients. The surgeries that resulted in fistulas are presented in Table 1.

In 70 (79.5 %) cases there was a single fistula, in 6 (6.9 %) — two, and in 12 (13.6 %) there were multiple fistulas (three or more intestinal fistulas).

Enterocutaneous fistulas were diagnosed in 61 patients, enteroatmospheric fistulas — in 26 patients, and combined fistula (enterocutaneous and enteroatmospheric) — in 1 patient.

Among the patients with enterocutaneous fistulas, 25 (28.4 %) patients had complete fistulas, 34 (38.6 %) — incomplete fistulas, and 2 (2.3 %) patients had combined fistulas. In patients with enteroatmospheric fistulas complete fistulas were found in 11 (12.5 %) cases, incomplete ones — in 14 (15.9 %).

Forty-six (52.3 %) patients were admitted in satisfactory condition, 16 (18.2 %) — in moderate

Table 1. Operations that resulted in ECFs

Таблица 1. Операции, после которых возникли тонкокишечные свищи

Type of surgical intervention Вид оперативного вмешательства	Number of patients, Кол-во больных, *n* (%)
Surgery for adhesive intestinal obstruction Операция по поводу спаечной кишечной непроходимости	23 (26.4 %)
Colon surgery Операции на толстой кишке	20 (22.7 %)
Appendectomy Аппендэктомия	9 (10.1 %)
Surgery for abdominal trauma Операции по поводу травмы живота	8 (9.1 %)
Hernia repairs Грыжесечения	8 (9.1 %)
Gynecological surgeries Гинекологические операции	6 (6.8 %)
Sequestrectomy Некрсеквестрэктомии	3 (3.4 %)
Operations on abdominal aort Операции на брюшном отделе аорты и на ее ветвях	1 (1.1 %)
Urology surgery Операции урологического профиля	1 (1.1 %)
Cholecystectomy + choledocholithotomy Холецистэктомия + холедохолитотомия	1 (1.1 %)
Other surgeries (drain of abscess, bariatric surgery, etc.) Прочие операции (вскрытие абсцессов, бариатрическая хирургия и т. д.)	5 (5.7 %)
Without surgery Без операции	3 (3.4 %)
Total Всего	88 (100 %)

condition, 18 (20.5 %) — in serious condition, and 8 (9.0 %) — in critical condition. Extremely severe and severe were the patients with enteroatmospheric and high enterocutaneous fistulas.

Complications of ECFs were registered in 64 (72.7 %) patients. Sepsis occurred in 4 (4.5 %) patients. In 3 (3.4 %) cases EAFs were followed by the development of diffuse peritonitis, which required urgent surgical intervention. Abscesses and phlegmons of the anterior abdominal wall were diagnosed in 14 (15.9 %) patients. In 58 (65.9 %) patients the symptoms of dermatitis around the fistula were diagnosed. Intestinal output per day ranged from 20 to 5000 ml (mean volume — 831.8 mL). It should be noted that 53 (60.3 %) patients lost more than 500 mL per day. All patients were stratified by ASA (American Society of Anesthesiologists) physical status classification: 55 (62.5 %) patients — ASA 2, 23 (26.1 %) — ASA 3, and 10 (11.4 %) patients — ASA 4.

Patients were examined according to a standard protocol, including: clinical blood and urine tests; biochemical blood tests with assessment of protein status; coagulogram; bacteriological tests of blood, urine, sputum and wound drainage for sterility with detection of antibiotic resistance; electrophysiological (electrocardiography), radiological (X-ray examination; multispiral computed tomography of thoracic and abdominal cavity organs) and other instrumental methods of examination (esophagogastroduodenoscopy, ultrasound examination of abdominal cavity and retroperitoneal space).

An important role in determining the plan of two-stage treatment was played by radiological methods of examination, including X-ray fistuloenterography (Fig. 1) and multispiral computed tomography (MSCT), which were performed in all patients with ECFs according to the standard technique.

For a complex assessment of the configuration of the intestine carrying the fistula and planning the tactics of preoperative preparation, as well as surgical intervention, the main questions were highlighted and answered together with the radiological diagnosticians:

1) length of the afferent intestinal loop, leading to the fistula;

2) length of the efferent intestinal loop;

3) evaluation of the total length of the small intestine;

4) identification of the intestinal compartment that carries the fistula;

5) fistula count determination;

6) determination of loop length between fistula defects in multiple fistulas.

In addition, CT scans were used to evaluate:

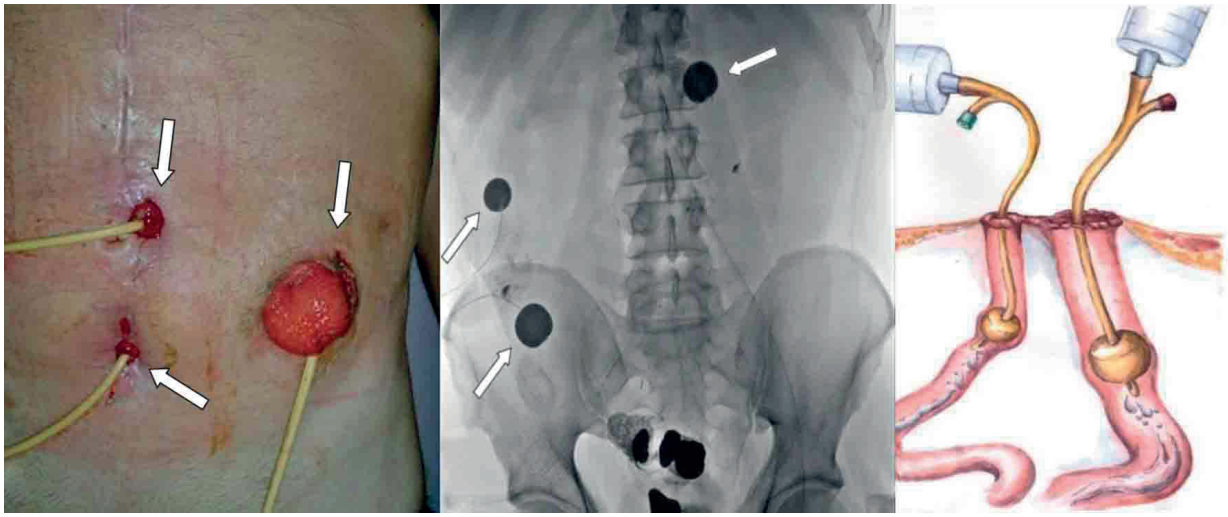


Figure 1. X-ray examination technique: A — abdominal wall appearance; Foley catheters inserted into all intestinal fistulas; B — X-ray image: cuffs filled with contrast; C — intestine contrast scheme

Рисунок 1. Методика выполнения рентгенологического исследования: А — внешний вид брюшной стенки; катетеры Фолея введены во все кишечные свищи; В — рентгенограмма: манжетки заполнены контрастом; С — схема выполнения контрастирования кишечника

– severity of infiltrative tissue changes of the anterior abdominal wall, mesentery, and wall of the small intestine;

– targeted search of abscesses of abdominal cavity and abdominal wall, foreign bodies in abdominal cavity (Fig. 2);

– condition of the parenchymatous organs of the abdomen, chest and pelvis, which allows to detect various complications and concomitant diseases (Fig. 3).

Figure 2. Abdominal CT scan, arterial phase. Foreign body of the abdominal cavity (gauze pad)

Рисунок 2. КТ органов брюшной полости, артериальная фаза. Инородное тело брюшной полости (марлевая салфетка)

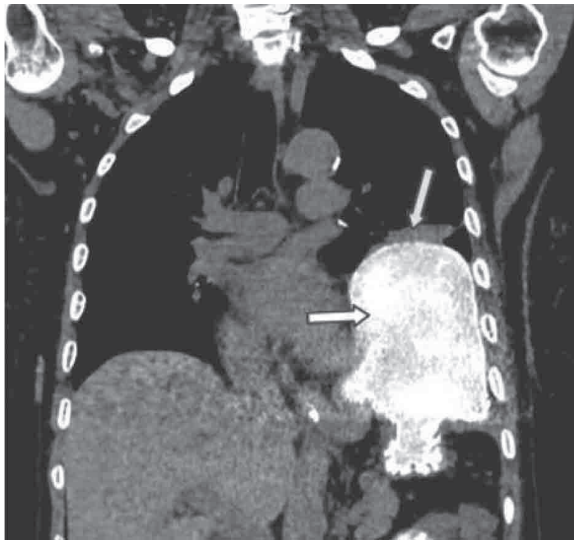


Figure 3. Chest CT scan, frontal projection. Oral gastric contrast in a patient with multiple ECFs: left-sided diaphragmatic hernia, gastric translocation into the left pleural cavity, compression atelectasis of the lower lobe of the left lung

Рисунок 3. КТ грудной клетки, фронтальная проекция. Пероральное контрастирование желудка у больной множественными ТКС: левосторонняя диафрагмальная грыжа, транслокация желудка в левую плевральную полость, компрессионный ателектаз нижней доли левого легкого

First stage — conservative treatment

After the patients were admitted to the National Medical Research Center of Surgery named after A. Vishnevsky, the preparation time for reconstructive surgery ranged from 0 to 75 days (on average — 10.0 days). The main components of the conservative phase of treatment included:

1) assessment and correction of the patient's nutritional status;

2) control of generalized infection;

3) local wound treatment.

Nutritional support was given to all patients. The enteral route of administering nutritional mixtures in the monovariant was used in 36 (40.9 %) patients. Total parenteral nutrition was performed in 30 (34.1 %) patients. Twenty-two (25.0 %) patients received combined nutrition, including enteral and parenteral administration of nutritional drugs. The "distal feeding" (introduction of enteral nutritional mixtures into the efferent intestine loop through the Foley catheter) was used in 8 (9.1 %) patients with ECFs.

Control of infection generalization and treatment of infectious complications was carried out by sanation of infection foci with the prescription of antibiotic therapy in accordance with the results of microbiological examination of body fluids (blood, urine, sputum, discharge from drains, fluid obtained by puncture) according to the "Sepsis-3" concept [9]. Preoperative antibiotic therapy was administered to 13 (14.8 %) patients.

Figure 4. A Foley catheter is inserted into the efferent intestine loop for "distal feeding"

Рисунок 4. Катетер Фолея установлен в отводящую кишку для «дистального» питания»

Local ECFs treatment was necessary for all patients. The most common method of local treatment of patients with ECFs was the use of barrier agents in combination with intestinal content collection devices (ostomy bag). In 36 (59 %) of 61 patients with formed ECFs, the use of barrier pastes in combination with moisturizing and healing creams and proper fixation of systems to collect intestinal contents enabled regression of dermatitis, provided patient mobility and accurate measurement of the amount of intestinal output.

In 22 (36.1 %) patients with incomplete ECFs, located in a flat wound without maceration and dermatitis, loss of intestinal discharge less than 150 mL per day, the method of daily dressings was used. Active drainage of the fistula area was required in one (1.6 %) patient with ECFs located in a flat wound and significant manifestations of dermatitis. For him the "in the air stream" drainage was used with application of a two-channel drainage tube.

In two (3.3 %) patients with incomplete ECFs, obturators were used, which significantly reduced the amount of intestinal chyme loss through the fistula. Active drainage was the main method of wound care in EAFs, which was performed in 17 (63.0 %) of 27 patients.

U-shaped Chaffin drainage was used in one (3.7 %) patient with a deep open wound into which an unformed duodenal fistula opened (Fig. 5).

In six (22.2 %) patients, the EAFs were located at the bottom of a deep cavity, whose wall tissues had reached the second phase of the wound process, and the skin edges were not infiltrated and mobile, which allowed creating a tight space by suturing the skin edges of the wound over the fistula and providing aspiration drainage with a medical multichannel silicone tube through a contrinsicion (Fig. 6).

"In the air stream" drainage was used in five (18.5 %) patients with EAFs (Fig. 7). The wound surface was covered with gauze pads or self-adhesive film. In two (7.4 %) patients, the EAFs opened into a deep cavity, and the wound was in first phase of the wound process and had infiltrated edges. In such a case, "in the air stream" drainage with a Chaffin drainage tube was applied. In two (7.4 %) patients, "in the air stream" drainage was inadequate due to thick intestinal discharge, which required flow-through drainage with Kanshin double-lumen drainage. In one (3.7 %) case the method of drainage of the afferent loop was applied. In two (7.4 %) patients with EAFs, vacuum therapy (VAC-therapy) was used as a temporary measure. Both patients had multiple ECFs located deep in the wound. In one (3.7 %) case in a patient with two ECFs located more than 100 cm

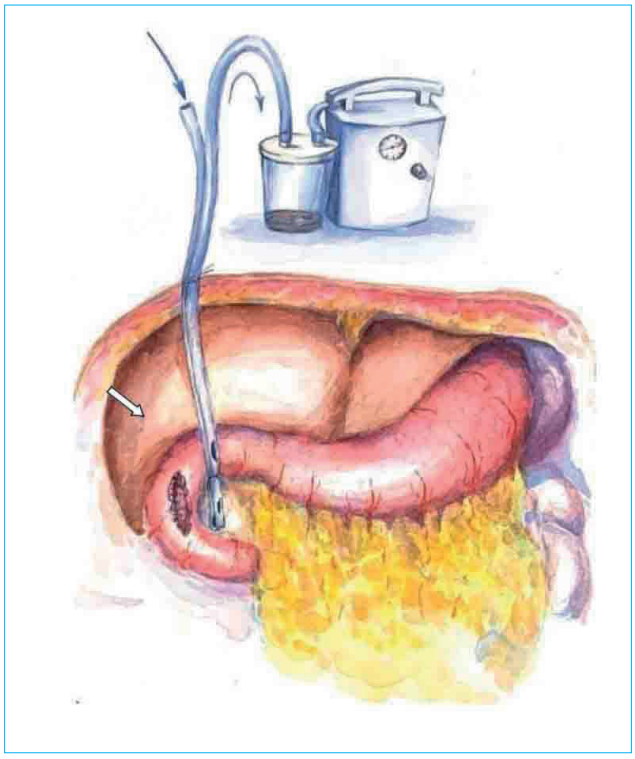


Figure 5. A U-shaped Chaffin drain is inserted into a deep wound into which a duodenal fistula opens

Рисунок 5. У-образный дренаж Чаффина установлен в глубокую рану, в которую открывается дуоденальный свищ

Figure 6. The skin edges of the wound were sutured. Active aspiration drainage was inserted into the fistula area through the contraincision (white arrow). A Foley catheter was inserted into the diverting loop of the intestine for "distal feeding" (yellow arrow)

Рисунок 6. Кожные края раны ушиты. Дренаж на активной аспирации установлен в область свища через контрапертуру (белая стрелка). Катетер Фолея введен в отводящую петлю кишки для «дистального питания» (желтая стрелка)

from each other according to X-ray fistulography the technique of "prosthetics" of intestinal passage using corrugated tubes was used (Fig. 8). In seven (25.9 %) patients with EAFs, barrier agents were used in combination with intestinal content collection devices (ostomy bags).

Based on our experience, we have identified several basic points used in local treatment of patients with enteric fistulas (EF):

1) any method of draining the EF's zone requires constant monitoring of the proper functioning of the drainage system;

2) the number of pads that cover the wound in the area of the fistula should be minimal (no more than 2–3);

3) hydrogel dressings can be used to protect granulation tissue and prevent drying;

4) when performing local treatment of intestinal fistula adjacent to the wound, it is unacceptable to undertake its suturing (even if it is point-sized).

Second stage — reconstructive surgery

Several basic surgical techniques were used during surgical interventions, which helped to avoid intraoperative complications and improve the treatment results of patients with ECFs [10, 11].

1. Previous incisions were used for surgical access, and ligatures, granulomas, or mesh alloplastic materials, if used, were completely excised. No anterior abdominal wall incisions outside the existing defects were made.

2. External "rosettes" of ECFs located along the midline of the abdomen were isolated during excision of the postoperative scar. The fistulas in the place of previous drainage tubes were dissected from the abdominal cavity after mobilization of the intestinal loops.

3. After excision of the postoperative scar, the intestinal loops adjacent to the incision line were exposed, aiming to "reach" the parietal peritoneal sheet and mark the "layer" between the visceral and parietal sheets.

4. In case of massive rough visceral-parietal and visceral-visceral adhesions, the mobilization technique "from inside to outside" was used [12].

5. During mobilization and adhesiolysis, sharp tissue dissection with scissors was used. The arising

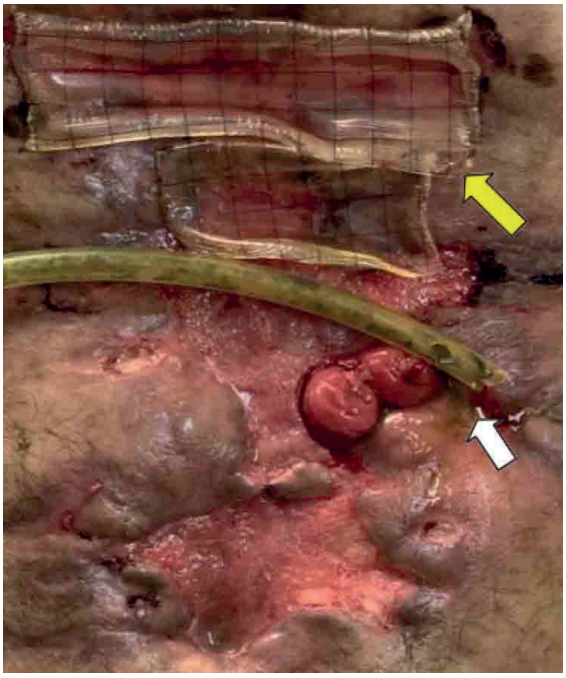


Figure 7. A variation of intestinal content aspiration in a flat wound: the drainage tube is located on the surface of the wound. The upper part of the wound is covered with a hydrogel dressing

Рисунок 7. Вариант аспирации кишечного содержимого при плоской ране: дренажная трубка расположена на поверхности раны. Верхняя часть раны укрыта гидрогелевой повязкой

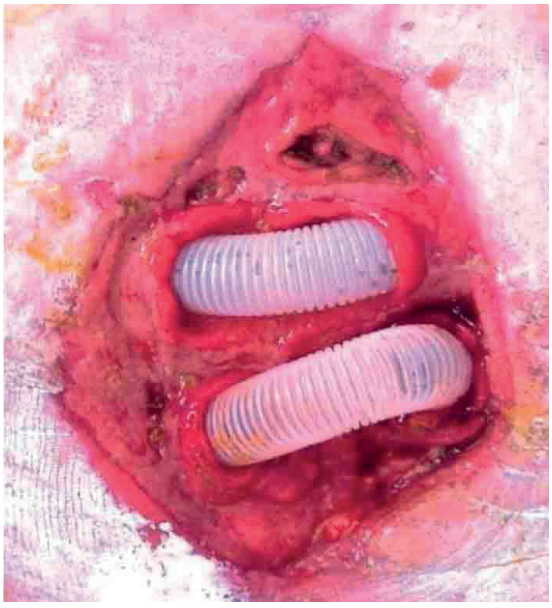


Figure 8. The use of corrugated tubes to transfer intestinal contents from the afferent to the efferent intestinal loop

Рисунок 8. Использование гофрированных трубок для перевода кишечного содержимого из приводящей в отводящую петлю кишки

bleeding was usually stopped by tampon compression or point bipolar coagulation.

6. Superficial lesions of the serous layer of the intestinal wall, inevitably occurring during adhesiolysis, were not sutured; when the lesion reached the submucosal layer, interrupted sutures were applied.

7. If intestinal perforation occurred, the hole was sutured with 4/0 or 5/0 monofilament resorbable thread. If multiple traumatic perforations of the small intestine were located close to each other or the mesentery was damaged at 3–4 cm or more, the damaged area was resected.

8. Resection of the intestine with fistula was performed with a few centimeters' distance from the fistula defect. An obligatory condition was the absence of inflammatory infiltration and scar deformation of the intestinal wall in the area of fistula intersection.

9. The method of anastomosis was selected based on the condition and diameter of the afferent and efferent loops. Preference was given to end-to-end anastomoses with 3/0 monofilament resorbable thread, 4/0 double-layered sutures.

Results

Since a significant part of patients with unformed EAFs were admitted to the National Medical Research Center of Surgery in a severe condition, the results of the complex treatment of patients with ECFs and EAFs were analyzed separately.

Enteroatmospheric fistulas (EAFs)

Among 27 patients with EAFs, urgent operations were performed in three (11.1 %) patients in whom fistulas opened into the abdominal cavity and were accompanied by peritonitis. In the other cases, the operations were performed after a short-term intensive preoperative preparation.

The main type of radical surgical interventions in patients with EAFs — resection of the small intestine the fistula with the formation of entero-entero anastomosis was performed in 17 (63.0 %) patients.

In four (14,8 %) patients with the remaining length of the small intestine less than 100 cm in the absence of infiltrative-inflammatory changes of the intestinal wall, an economic marginal resection of the small intestine wall with fistula and its further suturing with double-layer sutures was performed.

Three (11.1 %) patients with multiple fistulas of the small intestine, located on different loops at a distance of more than 30 cm between the fistulas, were resected with fistulas followed by anastomosis.

In three (11,1 %) patients, technical difficulties (rough adhesions, not completely resolved inflammatory tissue infiltration, massive conglomeration of intestinal loops with fistulas) were revealed during surgical intervention, which did not allow resection of compromised part of the small intestine. In this regard, an operation was performed to "turn off" the intestinal segment with fistula.

During this intervention, the loops of small intestine leading (afferent loop) and diverting (efferent) to the "fistulous" mass were identified. After that, the intestine leading to the fistula was transected, and the intestinal stump from the side of the fistula was sutured. The intestine diverting from the fistula was also transected and led to the abdominal wall as an enterostoma. The afferent and efferent loops of the small intestine in regard to the "disconnected" conglomerate were anastomosed with each other. The abdominal wall wound was sutured by its own tissues, with rare sutures to the disconnected conglomerate (Fig. 9, 10).

As a result of the described operation, physiological passage of intestinal contents was restored, and mucosal fistulas were formed. After 5–6 months, the previously disconnected intestinal conglomerate was removed.

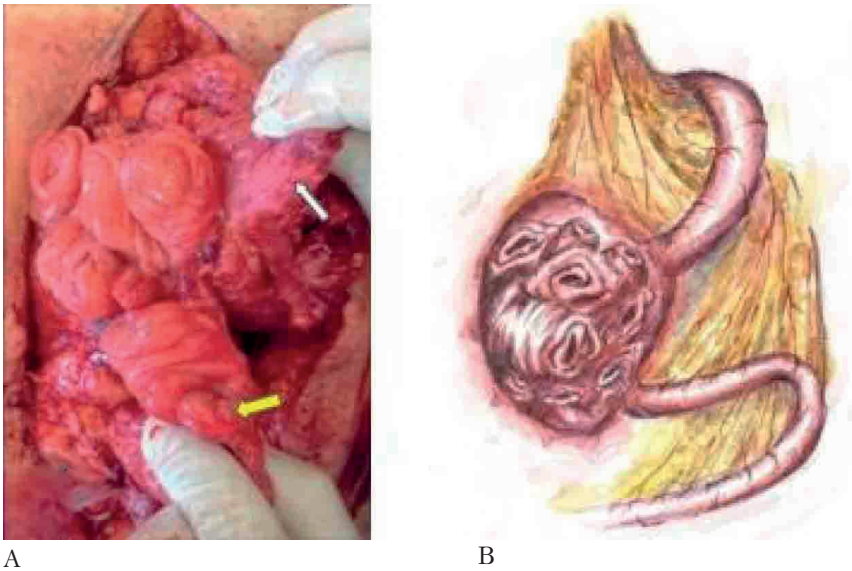
The median total duration of operations in patients with EAFs was 175 min (50 min; 505 min).

Median intraoperative blood loss was 150.0 mL (0 mL; 1700 mL). The maximum blood loss was 1700 mL in a patient with multiple EAFs. Hemotransfusion was performed perioperatively in five patients.

None of the patients had intraoperative complications.

In the postoperative period in patients with EAFs, complications occurred in 13 (48.1 %) cases. According to Clavien — Dindo classification (2009), postoperative complications in patients with EAFs were categorized as follows: eight cases were referred to complications of I–II grade (partial anastomotic leak with formation of external fistula, postoperative wound abscesses erosions of gastric mucosa, gastroparesis, lower lobe pneumonia); two cases — of grade IIIa (partial anastomotic leak with formation of fluid collection, which required ultrasound-guided drainage; intestinal bleeding from an acute ulcer the terminal ileum — X-ray endovascular occlusion of the intestinal artery was performed). There were three complications of grade IIIb — partial anastomotic leak, perforation of the deserosed part of the small intestine, which required relaparotomy or revision of the postoperative wound.

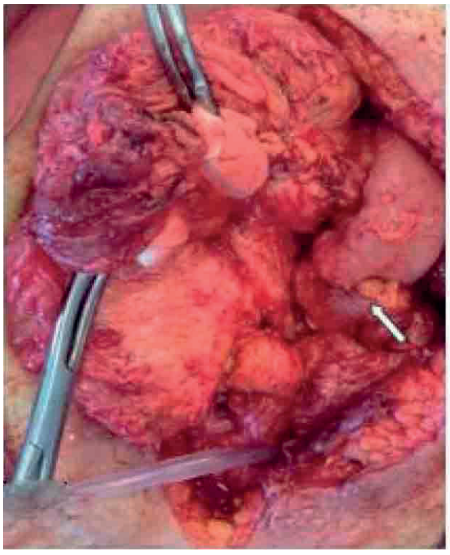
No lethal outcomes among patients with EAFs have been recorded.



A B

Figure 9. Operation of "turning off" a segment of the intestine with fistulas: A — intraoperative photograph (intestinal conglomerate, carrying fistulas, partially mobilized, afferent and efferent loops identified); B — the scheme of the operation

Рисунок 9. Операция «выключения» сегмента кишки со свищами: А — операционная фотография — кишечный конгломерат, несущий свищи, частично мобилизован, идентифицированы приводящая и отводящая петли; В — схема операции



A

B

Figure 10. An end-to-end anastomosis is formed between the driving and diverting loops in relation to the "disconnected" conglomerate: A — intraoperative photograph; B — the scheme of the operation

Рисунок 10. Между приводящей и отводящей петлями, по отношению к «отключенному» конгломерату, сформирован анастомоз «конец в конец»: А — операционная фотография, В — схема операции

Enterocutaneous fistulas (ECFs)

Among 61 (69.4 %) patients with ECFs, 54 (88.6 %) patients underwent resection of the small intestine with fistulas and the formation of entero-entero anastomosis.

Three (4.9 %) patients with multiple fistulas of the small intestine located in different loops and with the distance between fistulas over 30 cm underwent small intestine resection with fistulas and excision of intestinal fistula with suturing of the formed defect.

In three (4.9 %) patients with the length of the remaining small intestine less than 100 cm, marginal resection of the small intestine wall with fistula and its further suturing by double-layered suturing was performed.

In one (1.6 %) patient with multiple formed DCS, intraoperatively after resection of the proximal loop carrying a functioning high complete fistula, significant infiltration of the intestinal wall in the area of the distal conglomerate of small intestinal loops carrying fistulas was detected. Therefore, we performed an operation aimed at "disconnecting" the conglomerate of small intestine loops with fistulas. After three months — radical surgical intervention (removal of "disconnected" conglomerate of small intestine loops, carrying fistulas) was performed.

The median total duration of operations in patients with ECFs was 130 min (30 min; 370 min).

Median intraoperative blood loss was 100.0 mL (0 mL; 2000 mL). Maximum blood loss was 2000 mL in a patient with autoimmune liver cirrhosis and portal hypertension. Hemotransfusion was performed perioperatively in two patients.

None of the patients had intraoperative complications. Postoperative complications were recorded in 36 (59.0 %) patients.

In the postoperative period, complications occurred in 25 (41.0 %) cases in patients with ECFs. According to Clavien — Dindo classification (2009), postoperative complications in patients with ECFs were categorized as follows: 10 patients were referred to complications of grade I–II (partial anastomotic leak with formation of external fistula, wound abscess, erosions of gastric mucosa, gastroparesis, lower lobe pneumonia); one case — of grade IIIa (partial anastomotic leak with formation of fluid collection — ultrasound-guided drainage). There were 11 complications of grade IIIb — partial anastomotic leak, small intestine perforation, early adhesive intestinal obstruction, intra-abdominal bleeding, suppuration of subhepatic space hematoma, perforation of a giant gastric fundus ulcer with formation of a gastro-bronchial fistula, which required relaparotomy and revision of the postoperative wound. In three patients there were complications of grade IV–V — multiple organ dysfunction syndrome (MODS), sepsis resulting in death.

Postoperative complications and mortality according to Clavien — Dindo classification (2009) are presented in Table 2.

Three (3.4 %) patients with ECFs died from complications unrelated to the underlying disease and surgical interventions performed.

Table 2. Postoperative complications and mortality in ECFs patients according to the Clavien — Dindo (2009) classification

Таблица 2. Послеоперационные осложнения и летальность больных ТКС согласно классификации Clavien — Dindo (2009 г.)

Grade **Степень осложнений**	**Number of complications,** **Кол-во,** ***n* = 38 (43.2 %)**
I–II (wound abscess, gastroparesis, pneumonia erosions of gastric mucosa) I–II (нагноение послеоперационной раны, гастростаз, пневмония, эрозии слизистой оболочки желудка)	18 (20.4 %)
IIIa (partial anastomotic leak, acute ulcer bleeding) IIIa (частичная несостоятельность межкишечного анастомоза, желудочное кровотечение из острых язв)	3 (3.4 %)
IIIb (anastomotic leak, intraabdominal bleeding, early adhesive intestinal obstruction, small intestinal perforation) IIIb (несостоятельность межкишечного анастомоза, внутрибрюшное кровотечение, ранняя спаечная кишечная непроходимость, перфорация тонкой кишки)	14 (15.9 %)
IV–V, mortality (stroke, MODS on the background of giant peptic ulcer perforation with formation of gastrobronchial fistula, hepatic failure on the background of HbV-infection (HbSAg – positive) IV–V, летальность (ОНМК, СПОН на фоне перфорация гигантской язвы дна желудка с формированием гастробронхиального свища, печеночная недостаточность на фоне HbV-инфекции (HbSAg — положительный)	3 (3.4 %)

Discussion

The development of intestinal fistula (IF) in the postoperative period terrifies the patient and depresses the surgeon. This complication dramatically worsens the patient's well-being and condition, and the doctor is realizing that there is a real threat to "lose" the patient. As recently as 15–20 years ago, surgeons tried to save the patient's life with early operation, which often ended sadly [10]. With the possibility of providing complete parenteral nutrition and the use of effective nutrient mixtures, the tactics of IF treatment have changed fundamentally. At present, there is no doubt about the need for prolonged preoperative preparation of these patients, up to the formation of a formed, or enterocutaneous fistula (ECF), when inflammatory changes in the intestine are completely eliminated, which occurs, as a rule, after three months of treatment [11].

Preparing a patient for surgery is not an easy task. At any moment, even in a satisfactory condition, sepsis can break out, and severe pneumonia can join, which requires constant professional medical supervision and laboratory monitoring. The most difficult situation arises with high-output EAF, requiring absolute starvation and exclusion of fluid intake, which reduces the volume of intestinal content output through the fistula. Nevertheless, persisting chyme losses require constant replacement, which is difficult to achieve, especially in a conventional surgical hospital.

Conclusion

The method of two-stage treatment of patients with small intestinal fistulas improved the results and reduced the mortality rate to 3.4 %, and the described technical aspects of reconstructive interventions helped to completely avoid intraoperative complications. Treatment of patients with enterocutaneous fistulas is a complex, labor-intensive task and should be performed in specialized centers involving a multidisciplinary team of specialists.

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Submitted: 27.01.2023 Accepted: 09.07.2023 Published: 30.08.2023
Поступила: 27.01.2023 Принята: 09.07.2023 Опубликована: 30.08.2023