1. SUMMARY

1.1 Definition
Hemorrhoids are defined as the pathological enlargement of the internal (internal hemorrhoids) or external (external hemorrhoids) anal cushions. Combined or mixed hemorrhoids is an enlargement of both external and internal anal cushions [1,2].

Synonyms: hemorrhoidal disease.

1.2 Etiology and pathogenesis
Hemorrhoids are caused by acute or chronic disturbance of blood flow in the cavernous bodies. Along with circulatory disturbance, the dystrophic changes in the ligamentous apparatus of anal cushions also play a significant role in the development of hemorrhoids [2-3].

Under influence of the above-mentioned factors, the anal cushions increase in size and are displaced in the distal direction. In parallel, dystrophic changes are accumulating in the suspension apparatus, and hemorrhoids start to prolapse out of the anal canal. The development of dystrophic processes in the common longitudinal muscle of the submucosal layer of the rectum and in the Parks ligament, that keep cavernous bodies in the anal canal, leads to a gradual but irreversible displacement of hemorrhoids in the distal direction.

1.3 Epidemiology
Hemorrhoids are one of the most prevalent human diseases and the most common reason for the reference to a coloproctologist. The prevalence of the disease is 130-145 cases per 1000 adults and its share in the structure of colorectal diseases varies from 34 to 41% [1]. This disorder is equally common in men and women. There were 1 188 588 patients in 2013 throughout Russia on coloproctologists’ consultation, of whom 498 990 (41.9%) had hemorrhoids, in 2015 – 422 976 (35.0%), in 2017 – 481 007 (39.9%). An inpatient care in colorectal units was provided for 119 860 patients in 2013, 51 492 (42.9%) of them have had a diagnosis of hemorrhoids, in 2015 – for 46 956 (36.8%) patients, in 2017 – for 57 295 (41.3%) [75]. It should be noted, that a proportion of patients with hemorrhoids remains high in hospitalization structure in spite of the wide implementation of modern office procedures. Its even slightly higher in inpatient care than in outpatient. Modern lifestyle is associated with an increase in physical inactivity. Forced prolonged sitting at the computer, at work and at home, driving a car, etc., are accompanied by permanent stasis of blood in the pelvic organs, especially in the rectum. This leads to a rise in the incidence of hemorrhoids, which are increasingly affecting people of young and working age [1].

1.4 ICD-10 codes
Class – Diseases of the digestive system (Chapter XI):
K64 Hemorrhoids and perianal venous thrombosis
K64.0 First degree hemorrhoids
K64.1 Second degree hemorrhoids
K64.2 Third degree hemorrhoids
K64.3 Fourth degree hemorrhoids
K64.4 Residual hemorrhoidal skin tags
K64.5 Perianal venous thrombosis
K64.8 Other hemorrhoids
K64.9 Unspecified hemorrhoids

1.5 Classification [2-5]
By type:
4. Internal
5. External
6. Combined (of mixed)
By course:
3. Chronic (Table 1)
4. Acute (Table 2)

1.6 Clinical manifestations
1.6.1 Chronic hemorrhoids
The major clinical symptoms and signs of chronic hemorrhoids include:
4. Prolapse of internal hemorrhoids out of the anal canal during bowel movements;
5. Discharge of blood from the anal canal during def-
1. Symptoms and signs include:
4. Feeling of discomfort, moisture in the anal area;
5. Itching, burning in the anus;
6. Mucous discharge from the rectum.

Pain in chronic hemorrhoids is rare and usually associated with complications of the disease (thrombosed external and/or internal hemorrhoids) or the occurrence of anal fissure or rectal fistula (Table 3).

1.6.2 Acute hemorrhoids

Major clinical symptoms and signs of acute hemorrhoids include:
4. Pain in the anal area and rectum;
5. A dense painful formation(s) in the area of the external and/or internal anal cushions;
6. Profuse and abundant bleeding from the rectum, which does not stop despite conservative measures (suppositories, ointments, topical cold application, venoactive drugs, etc.).

The typical inflammatory symptoms, such as fever, can occur in case of the development of inflammatory complications of acute thrombosed hemorrhoids with the transition of the inflammatory process to the surrounding pararectal tissue.

1.7 Formulating a diagnosis

Diagnosis is made based on the combination of medical history data, complaints, and clinical presentation of the disease. When formulating a diagnosis, it is necessary to specify the presence of an external and/or internal component and indicate the stage of its chronic course. For each identified grade, it is desirable to indicate the location of hemorrhoids using the conventional o’clock positions.

Acute hemorrhoids is a complication of the chronic course.

Examples of diagnosis:
5. «Internal hemorrhoids of grade 2»;
6. «External and internal hemorrhoids of grades 3-4»;
7. «External hemorrhoids, complicated by acute thrombosis»;
8. «Internal hemorrhoids of grade 2 (3, 11 o’clock) and grade 4 (7 o’clock)».

2. Diagnosis

Diagnosis of hemorrhoids is based on the evaluation of complaints, the duration of the disease, and the results of digital rectal examination and instrumental methods of examination [6]. Differential diagnosis of hemorrhoids is carried out with other diseases of the colon and rectum (Appendix C) [2,9,10-13].

2.1 Complaints and history

- When taking a medical history, in all patients with hemorrhoids it is recommended to pay attention to the presence or absence of intestinal symptoms, the type of stool, and the previous examinations of the colon (colonoscopy) performed to exclude oncological and inflammatory bowel diseases [1,2].

Grade of recommendation C (Level of evidence 4)

Comments: In addition, it is important to elucidate etiological factors of the disease, such as gastrointestinal disorders, malnutrition, alcohol abuse, sedentary lifestyle, pregnancy and childbirth [1-3].

2.2 Physical examination

- In all patients with hemorrhoids, it is recommended to start with a visual inspection and assessment of the color of the skin and mucous layers [1,2].

Grade of recommendation C (Level of evidence 4)

Comments: Hemorrhoids are often complicated by anemia if associated with chronic or heavy bleeding.

- In all patients with hemorrhoids, it is recommended to perform external visual inspection of the perianal area [1-3].

Grade of recommendation C (Level of evidence 4)

Comment: The patient is examined on a gynecological chair in a supine position with the legs maximally brought to the abdomen, or in the knee-elbow position. In patients with severe somatic illness, the examination is performed in the lateral position. During the visual

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Table 1. Classification of chronic hemorrhoids

<table>
<thead>
<tr>
<th>Grades</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bleeding only, no prolapse</td>
</tr>
<tr>
<td>2</td>
<td>Internal hemorrhoids prolapse with straining or defecation but reduce into the anal canal spontaneously, with or without bleeding</td>
</tr>
<tr>
<td>3</td>
<td>Internal hemorrhoids prolapse with straining or defecation and usually require manual reduction into the anal canal, with or without bleeding</td>
</tr>
<tr>
<td>4</td>
<td>Permanently prolapsed hemorrhoids that cannot be reduced into the anal canal, with or without bleeding</td>
</tr>
</tbody>
</table>

Table 2. Classification of acute thrombosed hemorrhoids

<table>
<thead>
<tr>
<th>Grades</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Thrombosed hemorrhoids without inflammatory response</td>
</tr>
<tr>
<td>2</td>
<td>Thrombosed hemorrhoids with inflammation</td>
</tr>
<tr>
<td>3</td>
<td>Thrombosed hemorrhoids with inflammation and its distribution to the subcutaneous tissue, swelling of perianal tissue, and necrosis of mucosa of the hemorrhoids</td>
</tr>
</tbody>
</table>

* The acute course of the disease is also defined as profuse, abundant bleeding from internal hemorrhoids, requiring urgent admission of the patient to the hospital to stop bleeding and to carry out corrective therapy.
inspection of the perineal area and anus, the attention should be paid to the shape of the anus, its gaping, the presence of cicatricial changes and deformation, and the condition of the skin. It is necessary to determine the severity of external hemorrhoids, the degree of the prolapse of internal hemorrhoid and the possibility of its spontaneous reduction back into the anal canal [1-3].

- In all patients with hemorrhoids, it is recommended to perform assessment of the anal reflex in order to determine reflex contractions of the anal sphincter [1-3].

Grade of recommendation C (Level of evidence 4)

Comment: Streaking irritation of the skin in the perianal area is performed to assess reflex contractions of the anal sphincter.

- In all patients with hemorrhoids, it is recommended to perform digital examination of the anal canal and rectum in order to assess functional status of the obturative apparatus of the rectum, location and elasticity of internal hemorrhoids, their degree of mobility, the presence of concomitant diseases of the anal canal and rectum [1-3].

Grade of recommendation C (Level of evidence 4)

2.3 Laboratory diagnostics

- In all patients with hemorrhoids, for the differential diagnosis and assessment of the health status it is recommended to perform the following laboratory tests:
  
  o Complete blood count with measurement of blood hemoglobin level, red blood cell count, differential leukocyte count;
  o Urinalysis;
  o Biochemical blood test: total protein, albumin, urea, creatinine, glucose, alanineaminotransferase (ALT), aspartateaminotransferase (AST);
  o Blood electrolytes study (sodium, potassium, chlorine);
  o Hemocoagulogram [1].

Grade of recommendation A (Level of evidence 1b)

- In patients with hemorrhoids and anemia, it is recommended to perform measurement of the serum iron level [1, 2].

Grade of recommendation A (Level of evidence 1c)

Comments: The study is performed as an additional method of examination in order to assess the presence or absence of concomitant changes in the colon, and inflammatory changes characteristic of Crohn’s disease and ulcerative colitis [78].

Grade of recommendation A (Level of evidence 1c)

2.4 Instrumental diagnostics

- In all patients with hemorrhoids, it is recommended to perform anoscopy for examining the walls of the anal canal and the distal rectum [1-3].

Grade of recommendation C (Level of evidence 4)

Comments: The study includes determination of the location and severity of internal hemorrhoids, status of the mucous layer covering the internal hemorrhoids, dentate line with anal crypts, and status of the mucous layer of the lower part of the rectal ampulla.

- In all patients with hemorrhoids, it is recommended to perform proctology for the diagnosis of concomitant diseases of the rectum and sigmoid colon [1-3].

Grade of recommendation A (Level of evidence 1c)

- In patients with hemorrhoids aged below 50 years, when the concomitant clinical symptoms are present, it is recommended to perform colonoscopy or radiology to investigate all parts of the colon and terminal ileum in the frame of differential diagnosis with Crohn’s disease and ulcerative colitis [7,8].

Grade of recommendation A (Level of evidence 1c)

Comments: The study is performed as an additional method of examination in order to assess the presence or absence of concomitant changes in the colon, and inflammatory changes characteristic of Crohn’s disease and ulcerative colitis.

- In all patients over 50 years, it is recommended to perform colonoscopy or radiology to exclude bowel tumors.

Grade of recommendation A (Level of evidence 1c)

- In patients with hemorrhoids and baseline dysfunction of the anal sphincter, as well as in patients who underwent surgery for diseases of the perianal area and anal canal, it is recommended to perform functional assessments of the rectal closing apparatus before surgery.

Grade of recommendation C (Level of evidence 4)

2.5 Other diagnostic methods

- In patients with hemorrhoids, if a malignant process
is suspected, it is recommended to perform cytology of a dense hemorrhoid with ulceration [1,2].

Grade of recommendation А (Level of evidence 1а)
Comments: Biopsy is required for obtaining samples for histological and immunohistochemical studies.

- If a relapse of the disease is suspected after minimally invasive or radical surgical intervention, it is recommended to implement a complex of diagnostic measures (see physical examination, laboratory and instrumental diagnostics) in a volume depending on the specific situation [1,2].

Grade of recommendation С (Level of evidence 4)
- In the presence of concomitant diseases of other organs and systems, consultation by allied health professionals is recommended [1,2].

Grade of recommendation С (Level of evidence 4)

3. TREATMENT

3.1 Medical treatment
Pharmacotherapy of acute and chronic hemorrhoids has the following goals [2,3,18-20]:
1. Relief of symptoms of acute hemorrhoids;
2. Prevention of complications;
3. Prevention of relapses in the chronic course of the disease;
4. Preparation for surgery;
5. Postoperative rehabilitation.

One of the main goals of medical treatment for hemorrhoidal symptoms is normalization of the activity of the gastrointestinal tract and elimination of constipation by consuming an adequate amount of fluid and dietary fiber [13-17]. However, the conservative treatment aimed at normalizing the activity of gastrointestinal tract is itself not an independent effective method for treating hemorrhoids, especially of grades 3-4.

- As a source of dietary fiber in patients with hemorrhoids and concomitant bowel dysfunction, the wheat bran, seaweed and flaxseed in their natural form or in the form of pharmacological preparations are recommended. Other treatments include preparations containing husks of Plantago psyllium seeds or lactulose, which have a high water-retention capacity allowing a patient to avoid straining during defecation [15-17].

Grade of recommendation С (Level of evidence 4).

The basic pharmacotherapy of hemorrhoids includes both systemic and topical treatments used in the form of gels, creams, ointments and suppositories. For the pain syndrome, it is recommended to use non-narcotic analgesics, local anaesthetics (benzocaine, lidocaine) and topical combination treatments (in the form of gels, creams, ointments and suppositories) containing components with analgesic, anti-inflammatory and healing effects (combination of lidocaine/fluocortolone), as well as micronized purified flavonoid fraction (MPFF). For the thrombosed hemorrhoids, it is recommended to use topical anticoagulants (heparin-containing ointment bases) and systemic venotonic agents containing MPFF, diosmin, hesperidin, rutosides or other flavonoids. For the thrombosed hemorrhoids, complicated by inflammation of the surrounding soft tissues (after the purulent-inflammatory process was excluded), it is recommended to administer combination treatments containing pain-relieving, thrombotic and anti-inflammatory components (combination of lidocaine/fluocortolone etc.), as well as systemic venotonic agents containing MPFF, diosmin, hesperidin, rutosides or other flavonoids. For relieving the inflammation and anaesthesia, the topical agents with anti-inflammatory and analgesic properties and systemic NSAIDs with complex mode of action are recommended (Ketoprofen, Diclofenac, Indometacin, etc.). In hemorrhoidal bleedings, the topical treatments (in the form of ointments or suppositories with phylephrine) containing components with hemostatic or vasoconstrictive properties, systemic hemostatic agents (sodium ethamsylate, tranexamic acid), as well as MPFF are recommended [2,3,17-20].

Grade of recommendation В (Level of evidence 1а)
Classification of the main drugs used in pharmacotherapy of hemorrhoids and their administration route are presented in Table 4. The main therapeutic effects are summarized in Table 5.

Grade of recommendation В (Level of evidence 1а)

3.2 Minimally invasive surgical procedures
Minimally invasive surgical procedures are aimed at reducing blood flow in hemorrhoids, reducing the volume of hemorrhoids and fixing them to the intestinal wall. The particular treatment is selected individually for each patient based on the leading symptoms of hemorrhoids. Criteria for the initiation of minimally invasive treatment:
3. Informed consent form signed by the patient;
4. The absence of chronic diseases at the stage of decompensation or severe organ dysfunctions.

- Sclerotherapy is indicated in grades 1-3 internal hemorrhoids and is most effective in grades 1-2 bleeding hemorrhoids. It is also possible to perform it for the elimination of bleeding in patients with any grade of hemorrhoids when the disease is complicated by the
development of moderate or severe post-hemorrhagic anemia [27,29-31,37-39].

**Grade of recommendation B** (Level of evidence 1b)

**Comments:** The efficacy of the methods is 60-70%. Infrared photocoagulation is ineffective at advanced stages of the disease with prolapse of the mucous layer of the lower ampulla of the rectum [32].

**Contraindications:** inflammatory diseases in the anorectal region and perineum.

**Procedure:** with a light guide the neck of hemorrhoid is coagulated by the heat flux generated by an infrared focused beam directed to the hemorrhoid. By moving the light guide 45 degrees to the right and left, the coagulation is performed at 3-4 points in the area of hemorrhoidal neck, leaving the areas of free mucous up to 0.5 cm between them. The duration of coagulation at each point depends on the size of hemorrhoid and ranges from 1 to 3 seconds.

- Doppler-guided hemorrhoid artery ligation (DGHAL) with mucopexy is recommended for grade 2-4 hemorrhoids and is more effective in patients with grade 2-3 of the disease [33,36].

**Grade of recommendation B** (Level of evidence 2a)

**Comments:** At present, the DGHAL with mucopexy is the...
most effective and safe method of treating patients with grade 2-3 hemorrhoids [33,36,44]. After performing this technique, patients can be discharged from the hospital within 24 hours for the further follow-up. Possible complications in the postoperative period include pain during defecation (10%), urinary retention (5%), and thrombosis of external hemorrhoids (2%). In case of recurrence of the disease, accompanied by hemorrhoid prolapse, the DGHAL and mucopexy can be repeated.

**Contraindications:** inflammatory diseases in the anorectal region and perineum.

**Procedure:** this intervention is performed using special equipment required to fix mucous layer of the lower ampulla of the rectum. After suturing and ligation of the branches of the superior rectal artery with eight-shaped sutures under Doppler guidance, in the area of the most pronounced prolapse of rectal mucosa the continuous suture is applied from the dearterialization zone (3-4 cm above the dentate line) to a level located at 0.5-1.0 cm proximal to the dentate line. By tying the ends of the threads, the stitched mucous layer is tightened in the proximal direction with squeezing of the proximal prolapsed part of the internal hemorrhoid.

- The DGHAL is recommended for grade 2-4 hemorrhoids and is more effective in patients with grade 2-3 of the disease [40,41].

**Grade of recommendation B (Level of evidence 1b)**

**Comments:** the efficacy of the procedure in patients with grade 2-3 hemorrhoids is 81%. No antibiotic therapy or use of narcotic analgesics required after surgery. The postoperative pain syndrome is of low intensity and reduces the time of patients' recovering [34,35].

**Contraindications:** inflammatory diseases in the anorectal region and perineum.

**Procedure:** with a special anoscope with Doppler ultrasound transducer, the location of the terminal branches of the superior rectal artery is determined using the clock face view. Through the window of the anoscope, the operator performs suturing and ligation of the identified branches of the superior rectal artery in the lower ampulla of the rectum, at the level of 2-4 cm above the anorectal line. Usually, the ligation from 3 to 6 arteries is performed during the procedure [33,43].

- Rubber band ligation of hemorrhoids is recommended in grade 2-3 hemorrhoids in the presence of separately located internal hemorrhoids with clear boundaries [3,16-28].

**Grade of recommendation B (Level of evidence 1b)**

**Comments:** in the late postoperative period, good treatment outcomes are observed in 65-85% of cases [26-28]. The rubber band ligation is considered as an effective method for minimally invasive treatment of hemorrhoids, which is associated with low rates of relapse. However, pain syndrome after ligation is more pronounced than after sclerotherapy or infrared photocoagulation of internal hemorrhoids [21,22]. In addition, the rubber band ligation is associated with a risk of thrombosis of external hemorrhoids and rare cases of inflammatory complications [42]. The single-session ligation of more than two hemorrhoids is associated with a higher risk for the development of vaginal symptoms (bradycardia, hypotension, collapse), severe pain in the postoperative period, as well as the risk of recurrence of hemorrhoidal symptoms, compared to ligation performed in several sessions with an interval of 3-4 weeks [23-25].

**Contraindications** for this technique are circular hemorrhoids, the lack of clear boundaries between the external and internal components, anal fissure, and rectal fistula.

**Procedure:** A vacuum ligator attached to the suction device creating a negative pressure is brought through the anoscope close to the internal hemorrhoid. The part of the hemorrhoid located proximal to the dentate line is sucked into the tubular cavity of the ligator. After reaching a negative pressure of 0.7-0.8 atmospheres, two latex rings are dropped onto the captured part of the hemorrhoid with the help of a trigger mechanism. The pressure is then equalized, and ligator is removed from the intestinal lumen.

### 3.3 Surgery

**Criteria for the surgery:**

1. Informed consent form signed by the patient;
2. The absence of chronic diseases at the stage of decompensation or severe organ dysfunctions.
- Hemorrhoidectomy is recommended for patients with grade 3-4 disease with large external hemorrhoids, when minimally invasive surgical methods are ineffective or cannot be performed [1,2,14,16,21,45-59].

**Grade of recommendation B (Level of evidence 1a)**

**Comments:** Hemorrhoidectomy remains one of the most effective procedures for hemorrhoids [21]. At the same time, patients after surgery often require quite a long recovery period and have rather high rates of complications that practically do not occur after other procedures. The most commonly used are open and closed hemorrhoidectomy, which can be performed with scalpel, diathermocoagulation, laser, or ultrasonic scissors. None of the types of hemorrhoidectomy has a significant advantage over the others [45-49].

- Closed hemorrhoidectomy (with repair of the mucous layer of the anal canal) is recommended in the case of absence of clear boundaries between external and internal hemorrhoids [10,60,61].

**Grade of recommendation B (Level of evidence 1b)**

**Comments:** The most common complications include anal incontinence (8.5%), anal stricture (2%), postop-
operative bleeding (2.7%), and constipation (4%).

**Procedure:** The Bilroth’s clamps are placed at the base of the internal hemorrhoid above the dentate line. Hemorrhoid is transected to the vascular pedicle, which is then sutured and ligated. Hemorrhoid is excised distal to the ligation site at the vascular pedicle. The wound is sutured with seizing the edges and the bed using separate interrupted sutures or continuous suture with an absorbable thread. The external hemorrhoid is excised as a single unit with an internal hemorrhoid or separately. The wound is also sutured with separate sutures with the absorbable thread.

- **Open hemorrhoidectomy** is performed in patients with grade 3-4 of the disease as a separate treatment, as well as in cases of a combination of hemorrhoids with inflammatory diseases of the anal canal (anal fissure, rectal fistula) [10,49,60-62].

**Grade of recommendation B (Level of evidence 1b)**

**Comments:** The most common complications include anal incontinence (8%), acute urinary retention (1%), and bleeding after the surgery (2%).

**Procedure:** The internal hemorrhoid is cut to the vascular pedicle, which is then sutured and ligated. Hemorrhoid is excised distal to the ligation site. Thorough hemostasis is achieved. The wound is not sutured. The external hemorrhoid is excised as a single unit with an internal hemorrhoid or separately.

- **Submucosal hemorrhoidectomy** can be used for grade 3-4 hemorrhoids [1,2,63].

**Grade of recommendation C (Level of evidence 4)**

**Comments:** This technique provides a complete restoration of the mucous layer of the anal canal and rectum with a submucosal location of the stump of hemorrhoid without any deformation or tension [1,2,63]. Due to the increased bleeding of tissues during submucosal mobilization of cavernous tissue, the operation is accompanied by technical difficulties [1].

The most frequent complications of this type of hemorrhoidectomy are reflex urinary retention (6%) and bleeding from the wounds of the anal canal in the early postoperative period (1.5%) [12].

**Procedure:** Two-three mL of 0.25% procaine solution is injected in the submucosal layer in the area of the internal hemorrhoid, creating a «hydraulic pad» above it. With two arcuate cuts the mucous layer over the hemorrhoid is dissected, and hemorrhoid cushion is released from the surrounding tissue to the vascular pedicle. Then the pedicle is sutured, and hemorrhoid is cutting out. The mucous layer of the anal canal is restored with separate nodal stitches (Vicryl Rapide 3-0, Safil 3-0, Catgut 3-0), plunging the stump of the hemorrhoid into the submucosal layer.

- **Stapled hemorrhoidopexy (Longo procedure)** is recommended in grade 3-4 hemorrhoids, as well as the combination of hemorrhoids with prolapse of the mucous layer of the lower ampulla of the rectum.

**Grade of recommendation A (Level of evidence 1a)**

**Comments:** Stapled hemorrhoidopexy is associated with less postoperative pain and shorter rehabilitation period, compared with traditional hemorrhoidectomy. However, the rates of postoperative complications, both after stapled hemorrhoidopexy and after traditional hemorrhoidectomy (open or closed) are approximately the same [14,51-57,70]. The comparison of outcomes after stapled hemorrhoidopexy and rubber band ligation has shown that pain in the postoperative period was more intensive after hemorrhoidopexy [71].

The **procedure** is aimed at fixing and lifting of internal hemorrhoidal cushion by circular resection of the mucous-submucous layer of lower ampulla of the rectum using the stapling instrument producing the mechanical suture, which prevents propping of internal hemorrhoids in the future [14, 20, 51-58, 64-69]. In the stapled hemorrhoidopexy, the internal and external hemorrhoids are not excised.

Among the **complications** of the procedure, the cases of rectovaginal fistula, rectal fistula, rectal stricture, bleeding, retroperitoneal phlegmon, and rectal perforation were reported in the literature [14,20,64-69].

**Procedure:** This intervention is performed using a special kit. First, the transparent anoscope is introduced into the anal canal in order to visualize the location of the dentate line. The dentate line serves as a landmark for determining the height of the formation of a purse string. The purse-string suture is then applied through the anoscope at a distance of 4-5 cm from the dentate line. The suture is started at 3 o’clock position and is placed with the capture of the mucous layer and submucous layer of the intestinal wall. By rotating the anoscope, a continuous purse suture is placed over the entire circumference of the lower ampulla of the rectum, with a distance between stitches from 0.5 to 1.0 cm. After removing the anoscope, the head of the circular stapler is introduced above the placed purse string, and the string is tightened on the stem of the device. At this step, the mucous layer should close tightly around the stem of the instrument. The ends of threads are pulled through the lateral holes at the base of the circular stapler and are fixed from the outside. The head is moved closer to the base of the device, and the resection of the circular portion of mucous-submucosal layer of the lower ampulla of the rectum is performed with a formation of a double-row stapled suture.

- **Hemorrhoidectomy using modern haemostatic devices** is recommended in grade 3-4 hemorrhoids.

**Grade of recommendation A (Level of evidence 1a)**

**Comments:** These techniques in grade 3-4 hemorrhoids provide a significant reduction in the intensity and duration of the pain syndrome, the length of recovery period,
and the rate of dysuric disorders [2,47,59,72-74]. Good outcomes are reported in up to 96.4% of patients.

Hemorrhoidectomy with LigaSure device is associated with a significant reduction in pain intensity, especially in the first days after surgery, and in the volume of intraoperative blood loss. The duration of the operation is reduced to 9-15 minutes. This type of hemorrhoidectomy is also associated with a shorter recovery period. The wound healing was found to take more time in case of early divergence of the wound edges (on days 3-6 after the procedure) after hemorrhoidectomy with the LigaSure device. As for the rates of postoperative complications, such as bleeding in the early postoperative period, anal incontinence, and anal stricture, the hemorrhoidectomy with the LigaSure device does not have significant advantages compared to other surgical techniques for hemorrhoids [59,74].

**Procedure of hemorrhoidectomy with the LigaSure device:** The internal hemorrhoid is captured by the Luer's forceps, and the vascular pedicle is sutured. The jaws of the LigaSure coagulating shears are placed on the base of hemorrhoids from the outside to the inside. After coagulating, the hemorrhoid is excised with scissors to the vascular pedicle on the outer edge of the coagulation layer. The coagulation of the vascular pedicle by the device is carried out twice with placing the instrument jaws without leaving a gap between the coagulated areas. Then, the vascular pedicle is transected with scissors along the outer edge of the coagulation layer, and the hemorrhoid is removed.

**Procedure of hemorrhoidectomy with the UltraCision device:** The tissues are dissected at the base of the external hemorrhoid with ultrasonic scissors in the cutting mode. Then, the external and internal components are removed as a single block until complete transection. Treatment of the vascular pedicle is performed in coagulation mode [34].

### 3.4 Treatment of acute hemorrhoids

Treatment of acute thrombosis of external hemorrhoids includes both complex conservative therapy with regular follow-up (see Medical treatment), and surgical repair [1,27].

The decision on surgical treatment is made after the reduction of the inflammatory process in the routine order.

- In case of thrombosed hemorrhoid(s), it is recommended to perform thrombectomy or excision of thrombosed hemorrhoid(s) if there is an isolated thrombosis of 1-2 hemorrhoids or if the time from the onset of the disease to the decision about treatment approach does not exceed 72 hours.

**Grade of recommendation C (Level of evidence 4)**

**Comments:** Thrombectomy or excision of thrombosed hemorrhoid performed within 48-72 hours from the onset of the disease leads to a shortening of the rehabilitation period [71].

- In acute thrombosed hemorrhoid(s), the conservative therapy aimed at reducing pain and inflammation is recommended in the following cases:
  1. if time from the onset of the disease to the decision about treatment approach exceeds 72 hours.

**Grade of recommendation C (Level of evidence 5)**

### 4. POSTOPERATIVE TREATMENT

#### 4.1 Rehabilitation

Rehabilitation is a complex of measures aimed at overcoming a postoperative deficit that limits the patient's functions and daily life activities.

Patients after surgery for hemorrhoidal disease require rehabilitation due to surgical trauma in the perianal area, anal canal, or lower part of the rectum with the postoperative sutures in the sites of ligation of the superior rectal artery. The presence of postoperative wounds with violation of the integrity in these anatomical areas, the healing by secondary intention, and sutures in the areas of ligated hemorrhoidal arteries pose the risk of purulent-septic complications and postoperative bleeding due to suture failure. Pain syndrome of various severity and possible dysfunction of defecation and retention function in the postoperative period can lead to a significant social maladjustment and reduce the quality of life in patients of this category.

The goal of rehabilitation in patients who underwent surgery is their complete social and physical recovery. Stages of rehabilitation of patients after surgical treatment:

**Stage 1:** early rehabilitation, from 4-6 to 7-10 days after surgery. During this period, the patient receives rehabilitation care in a hospital for 3-5 days and further rehabilitation in a short-stay hospital or outpatient settings for 7-14 days.

One of the most important goals at the 1st stage of rehabilitation is the recovery of the gastrointestinal tract function with restoring the normal stool consistency and frequency. In addition, the monitoring of hemostasis, wound healing, and the relief of postoperative pain are carried out at this stage. Stage 2 takes place from 15 to 45 day after surgery and is aimed at facilitating the reparative processes and geometrically correct, programmable healing of
Various topical hemostatic agents (hemostatic sponges, stool consistency with limitation of excessive strains, capillary-strengthening action), and recovery of compositions with complex mode of action (including inspection of the wound, administration of ointment, the rehabilitation measures consist of the regular follow-up of the general (somatic and psycho-emotional) status of the patient. It includes a complex of diagnostic and therapeutic measures aimed at minimizing pain syndrome, programming the wound healing process (rate and anatomical feasibility of wound healing under microbiological control and observation by a physiotherapist), and eliminating the motor-evacuation disorders of the colon. The criteria for the end of rehabilitation is the healing of postoperative wounds in the perineum.

Hospital stage of rehabilitation (from 4-6 to 7-10 day after surgery)

• Dietary therapy: One of the important components of postoperative rehabilitation at an early stage is the normalization of the function of gastrointestinal tract, aimed at eliminating the constipation and restoring the normal stool consistency. To this end, patients are recommended to consume adequate amounts of fluid and dietary fiber. Wheat bran, sea cabbage and flaxseed in their natural form or in the form of dietary supplements or pharmacological preparations are used as a source of dietary fiber. The most commonly used are products with a high water retention, which are based on the psyllium seed husk, lactulose, macrogol. Their use results in the softening the stool consistency and contributes to the regular and complete defecation without the need for straining to empty the rectum. Control of hemostasis: After surgery of hemorrhoids with the excision of external and internal components of the cavernous tissue, the wounds are located in a well-vascularized area. Due to this, the bleeding from postoperative wounds during the first 2-3 weeks is common. In case of excessive bleeding from wounds, the rehabilitation measures consist of the regular inspection of the wound, administration of ointment compositions with complex mode of action (including capillary-strengthening action), and recovery of stool consistency with limitation of excessive strains. Various topical hemostatic agents (hemostatic sponges, cauterizing agents), as well as electrocoagulation of bleeding surfaces can be used.

Pain syndrome relief: The pain intensity depends on the extent of surgical trauma in the perianal region, anal canal and lower ampulla of the rectum, the individual pain threshold, and the presence of sutures on the wounds of the anal canal and in the areas of the ligation of the superior rectal artery branches. Systemic and/or topical agents for the pain relief are chosen at the discretion of the treating physician, depending on the degree of pain and the severity of psycho-emotional disorders. The most used agents are analgesics from the group of nonsteroidal anti-inflammatory drugs (NSAIDs), spasmylytic drugs, and topical combinations of anesthetics and anti-inflammatory drugs in the form of gels, creams, ointments and suppositories, which include topical anesthetic components and glucocorticoids.

Programmed wound healing process: One of the most important aspects of the postoperative recovery of patients, which allows avoiding the development of late postoperative complications (strictures, cicatricial deformity, etc.) is the timely and topographically verified healing of postoperative wounds. The proper management of the wound process, starting from the 2nd day after the operation and until complete epithelialization of the wounds, implies: 1) daily debridement of the wound with antiseptic solutions; 2) dressing with ointment applications (the composition of the ointment depends on the stage of the wound process); 3) regular inspection by a surgeon-coloproctologist (digital rectal examination every two days); 4) microbiological control (if purulent-septic complications or wound infection is suspected). In order to accelerate the reparative processes, reduce the inflammatory response and correct the course of the wound process, it is necessary to carry out physiotherapy in the volume prescribed by a physiotherapist.

The main rehabilitation measures after surgical treatment of hemorrhoids.

After discharge from the hospital, it is necessary to carry out rehabilitation measures in all patients who have undergone surgical treatment for hemorrhoids. Depending on the severity of the dysfunction, the complex of rehabilitation measures is carried out in the outpatient settings or on the hospital rehabilitation bed.

In patients with no or mild functional impairment (0–25%, see ICF), the rehabilitation is carried out on an outpatient basis. Patients of this category do not require any therapeutic or diagnostic measures with the participation of medical personnel, and they are completely socially adapted. Patients should be examined routinely every 5-7 days by a coloproctologist in order to
correct measures aimed at normalizing the function of defecation, and to monitor the wound process. In patients with moderate or severe problem (26-95% according to the ICF), the rehabilitation is carried out on the rehabilitation bed in the hospital settings. The reason for inpatient rehabilitation care with routine medical follow-up is inability of a patient to cope with some problems by him-/herself on the outpatient basis. These problems include:

- **Defecation disorder**, when a patient requires mechanical emptying of bowels:
  - cleansing or enema;
  - administration of osmotic-type laxatives, with an assessment of their efficacy;
  - mechanical removal of feces under local or regional anesthesia [2,4].

**Grade of recommendation С** (Level of evidence 4)

- **Pain syndrome** (with intensity above 6 scores on the visual analogue scale [VAS]):
  - prescription of potent analgesics from the group of NSAIDs by parenteral route;
  - application of the ointment compositions, containing topical anesthetic and anti-inflammatory agents, to the wound surfaces;
  - physiotherapy (ultraviolet irradiation, enzymatic, laser, ultrasonic methods, etc.) [2,4].

**Grade of recommendation С** (Level of evidence 4)

- Control of the wound process (to use topical and/or systemic anti-inflammatory drugs with regular/local monitoring of the level of inflammatory response, to perform microbiological control, if necessary):
  - treatment of wound surfaces with antiseptic solutions (chlorhexidine, dioxidine, Miramistin, iodine-povidone)
  - application of water-soluble ointment compositions containing antimicrobial components (Levomecol, Dioxycol, Levosin), or ointments containing antibacterial components (Oflomelid, Rozamet);
  - broad-spectrum antibiotics orally or parenterally (agents from the groups of penicillins, cephalosporins, macrolides, or fluoroquinolones);
  - sowing wound discharge in case of marked inflammatory changes in wounds, suspected contamination of wounds by pyogenic flora, with regular follow-up in 5-7 days after the course of antibacterial therapy;
  - physiotherapy (ultraviolet irradiation, enzymatic, laser, ultrasonic methods, etc.). [2, 4].

**Grade of recommendation С** (Level of evidence 4)

An outpatient stage of rehabilitation can also be implemented in a short-stay hospital (15–45 days after surgery). The goal at the 2nd stage of rehabilitation in patients after surgical treatment of hemorrhoids is the complete epithelization of postoperative wounds and prevention of postoperative complications, such as stricture and cicatricial deformity of the anal canal (6-9%), and postoperative anal sphincter incompetence (1.8-4%). In addition, during the 2nd stage of rehabilitation, it is important to continue monitoring of the consistency and frequency of stool, pain syndrome intensity, and wound process [2,4].

**Grade of recommendation C** (Level of evidence 4)

In order to prevent cicatricial deformity and stricture of the anus, the surgeon-coloproctologist should follow-up a patient and perform digital rectal examination every 3 to 5 days [2,4].

**Grade of recommendation C** (Level of evidence 4)

For the purpose of early detection of postoperative failure (if there are complaints of fecal retention dysfunction), all patients after surgery should undergo a pathophysiological study (sphincterometry) on day 40 after surgery, followed by a physiotherapist’s consultation [2,4].

**Grade of recommendation C** (Level of evidence 4)

In the absence of complete epithelialization, on the 45th day after the operation the wound can be considered non-healing in the long term. In these cases, it is necessary to perform microbiological seeding of wound discharge, polymerase chain reaction (PCR) for the exclusion of sexually transmitted diseases (STIs), and arrange consultations of and follow-up by a physiotherapist, a microbiologist [2,4,18].

**Grade of recommendation С** (Level of evidence 4)

4.2 Outpatient follow-up

In all patients who underwent surgery for hemorrhoids, after the end of treatment and wound healing the regular follow-up by a coloproctologist is recommended every 6 months during the first year [2,4,18].

**Grade of recommendation С** (Level of evidence 4)

5. PREVENTION

Fundamentals in the prevention of the development of hemorrhoids include restoration of the activity of gastrointestinal tract, elimination of constipation, and hygiene. In a patient with new-onset symptoms characteristic for hemorrhoids, a consultation of coloproctologist is required. Early diagnosis and treatment of the disease at the early stages can significantly improve the outcome and reduce the likelihood of complications [2, 4, 10].

**Grade of recommendation С** (Level of evidence 4)
APPENDIX A. Criteria for assessing the quality of medical care

<table>
<thead>
<tr>
<th>№</th>
<th>Quality criteria</th>
<th>Level of evidence</th>
<th>Grade of recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digital rectal examination was performed</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>Anoscopy/rectoromanoscopy was performed</td>
<td>1c</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>Colonoscopy in a patient aged ≥50 years was performed</td>
<td>1c</td>
<td>A</td>
</tr>
<tr>
<td>4</td>
<td>Conservative therapy and/or minimally invasive intervention (depending on the</td>
<td>1a-4</td>
<td>A-C</td>
</tr>
<tr>
<td></td>
<td>indications and if not contraindicated) was performed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Morphological (histological) examination of the sample of excised tissue was</td>
<td>1a</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>performed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Osmotic laxatives, in case of no spontaneous bowel movements within 3 days after</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>surgery, were prescribed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Dressings with digital examination in the postoperative period at least once daily</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>until discharge from the hospital were performed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Regular daily visual inspection of the wound process in the postoperative period</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>until discharge from the hospital was carried out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Relief of pain syndrome in the postoperative period was provided</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td>10</td>
<td>Spontaneous bowel movement at discharge from the hospital</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td>11</td>
<td>No purulent-inflammatory complications - -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>No repeated surgical interventions - -</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

APPENDIX B. Clinical guidelines development methodology

Target audience for the clinical guidelines:
1. Coloproctologists
2. Surgeons
3. Gastroenterologists
4. Primary care doctors
5. General practitioners (family doctors)
6. Endoscopists
7. Healthcare professionals with secondary medical education
8. Public health administrators
9. Medical experts of health insurance organizations (including involved in the medical and economic expertise)
10. Students of medical universities, residents, postgraduate students.

In these clinical guidelines, all information is ranked by the level of evidence, depending on the quantity and quality of research on this issue.

Table A1. Levels of evidences (Oxford Centre for Evidence-Based Medicine, 2009)

<table>
<thead>
<tr>
<th>Level</th>
<th>Therapy / Prevention, Aetiology / Harm</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Systematic review (with homogeneity*) of randomized controlled studies</td>
<td>Systematic review (with homogeneity*) of Level 1 diagnostic studies; CDR* with 1b studies from different clinical centres</td>
</tr>
<tr>
<td>1b</td>
<td>Individual randomized controlled study (with narrow Confidence Intervals)</td>
<td>Validating** cohort study with good» » »reference standards; or CDR» tested within one clinical centre</td>
</tr>
<tr>
<td>1c</td>
<td>All or none§</td>
<td>Absolute SpPins and SnNouts» » »</td>
</tr>
<tr>
<td>2a</td>
<td>Systematic review (with homogeneity*) of cohort studies</td>
<td>Systematic review (with homogeneity*) of Level &gt;2 diagnostic studies</td>
</tr>
<tr>
<td>2b</td>
<td>Individual cohort study (including low quality RCT; e.g., &lt;80% follow-up)</td>
<td>Exploratory** cohort study with good» » »reference standards; CDR» after derivation, or validated only on split-sample or databases</td>
</tr>
<tr>
<td>2c</td>
<td>«Outcomes» Research; Ecological studies</td>
<td></td>
</tr>
<tr>
<td>3a</td>
<td>Systematic review (with homogeneity*) of case-control studies</td>
<td>Systematic review (with homogeneity*) of 3b and better studies</td>
</tr>
</tbody>
</table>
Table A2. Grades of recommendations (Oxford Centre for Evidence-Based Medicine, 2009)

- A consistent level 1 studies
- B consistent level 2 or 3 studies or extrapolations from level 1 studies
- C level 4 studies or extrapolations from level 2 or 3 studies
- D level 5 evidence or troublingly inconsistent or inconclusive studies of any level

Terms for updating clinical guidelines

Clinical guidelines are to be updated every 3 years.

APPENDIX C. Differential diagnosis of hemorrhoids

<table>
<thead>
<tr>
<th>Complaints</th>
<th>Possible diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anorectal bleeding</td>
<td>Anal fissure</td>
</tr>
<tr>
<td></td>
<td>Malignant and benign tumors of the rectum and anal canal</td>
</tr>
<tr>
<td></td>
<td>Prolapse of the mucous layer of the rectum</td>
</tr>
<tr>
<td></td>
<td>Rectal prolapse</td>
</tr>
<tr>
<td></td>
<td>Ulcerative colitis</td>
</tr>
<tr>
<td></td>
<td>Crohn's disease</td>
</tr>
<tr>
<td></td>
<td>Hemangioma</td>
</tr>
<tr>
<td></td>
<td>Endometriosis</td>
</tr>
<tr>
<td></td>
<td>Rectal injury</td>
</tr>
<tr>
<td></td>
<td>Solitary ulcer of the rectum</td>
</tr>
<tr>
<td>Hemorrhoidal prolapse</td>
<td>Prolapse of the mucous layer of the rectum</td>
</tr>
<tr>
<td></td>
<td>Rectal prolapse</td>
</tr>
<tr>
<td></td>
<td>Fibrous anal polypans</td>
</tr>
<tr>
<td></td>
<td>Villous adenomas of the rectum</td>
</tr>
<tr>
<td>Severe pain in the anal area</td>
<td>Anal fissure</td>
</tr>
<tr>
<td></td>
<td>Acute or chronic paraproctitis</td>
</tr>
<tr>
<td></td>
<td>Anal tumors</td>
</tr>
<tr>
<td></td>
<td>Complicated caudal teratomas</td>
</tr>
<tr>
<td></td>
<td>Crohn's disease complicated by perianal lesions</td>
</tr>
<tr>
<td></td>
<td>Idiopathic anococcygeal pain syndrome</td>
</tr>
<tr>
<td></td>
<td>Endometriosis</td>
</tr>
<tr>
<td></td>
<td>Proctalgia</td>
</tr>
<tr>
<td>Anal itching</td>
<td>Rectal prolapse</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td>Anal sphincter incompetence</td>
</tr>
<tr>
<td></td>
<td>Diabetes mellitus</td>
</tr>
<tr>
<td></td>
<td>Villous tumor of the rectum</td>
</tr>
<tr>
<td></td>
<td>Chronic paraproctitis</td>
</tr>
<tr>
<td></td>
<td>Idiopathic anal itching</td>
</tr>
<tr>
<td></td>
<td>Malignant tumor of the rectum</td>
</tr>
<tr>
<td></td>
<td>Crohn's disease</td>
</tr>
<tr>
<td></td>
<td>Fungal diseases of the anal canal and perineum</td>
</tr>
<tr>
<td></td>
<td>Helminthiasis</td>
</tr>
<tr>
<td></td>
<td>Allergic dermatitis</td>
</tr>
<tr>
<td></td>
<td>Contact dermatitis (for topical agents)</td>
</tr>
<tr>
<td></td>
<td>Psoriasis</td>
</tr>
<tr>
<td></td>
<td>Poor hygiene of the perineum</td>
</tr>
<tr>
<td>Mucous or purulent discharge from the anal canal</td>
<td>Rectal prolapse</td>
</tr>
<tr>
<td></td>
<td>Solitary ulcer of the rectum</td>
</tr>
<tr>
<td></td>
<td>Anogenital warts</td>
</tr>
<tr>
<td></td>
<td>Anal fissure</td>
</tr>
<tr>
<td></td>
<td>Malignant tumor of the anal canal and rectum</td>
</tr>
<tr>
<td></td>
<td>Villous tumor of the rectum</td>
</tr>
<tr>
<td></td>
<td>Irritable bowel syndrome</td>
</tr>
<tr>
<td></td>
<td>Inflammatory diseases of the colon (Crohn's disease, ulcerative colitis)</td>
</tr>
<tr>
<td>Perianal edema</td>
<td>Acute paraproctitis</td>
</tr>
<tr>
<td></td>
<td>Anogenital warts</td>
</tr>
<tr>
<td></td>
<td>Tumors of the anal canal and rectum with perifocal inflammation</td>
</tr>
<tr>
<td></td>
<td>Diarrhea</td>
</tr>
<tr>
<td></td>
<td>Perineal pyoderma</td>
</tr>
</tbody>
</table>

REFERENCES

hemorrhoidectomy – is there any difference?


