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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ
ТБИЛИСИ - НЬЮ-ЙОРК

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3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

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3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შედეგის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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THE RESULTS OF SURGICAL TREATMENT OF COMBINED ANORECTAL DISEASES USING RADIO-FREQUENCY AND HIGH-FREQUENCY ELECTROSURGICAL DEVICES

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The combined pathology of the anal canal and rectum is a very important problem today, due to its progressive growth, especially in industrialized countries over the past two or three decades. Patients with hemorrhoids, anal fissure, anal abscess and anal fistula account for 19-42% in the structure of coloproctological diseases [2]. The most common combination of hemorrhoids with anal fissure, anal fistula, anal polyp, hypertrophied perianal skin tags, perianal warts [1].

Surgical treatment of combined pathology of the anal canal and rectum requires a special approach to the choice of tactics and method of treatment of this pathology, which provide minimal impact on tissues, preventing postoperative complications [8].

The progressive development of modern surgical technologies has contributed to the active introduction into coloproctological practice of new high-tech methods of surgical treatment of various pathologies of the anal canal and rectum. Thus, one of the first widely used in coloproctology was monopolar electrocoagulation, thanks to which it was possible to coagulate vessels up to 1 mm in diameter. It significantly reduced pain, especially in patients after open hemorrhoidectomy, provided adequate hemostasis, but at the same time, had a number of disadvantages: adhesion of tissue to the electrode, inefficient coagulation of tissues with high resistance, thermal damage to adjacent structures, great depth of tissue sometimes it can reach 9 mm [3].

Relatively recently, the modern range of proctology uses a bipolar electro thermal system "Liga Sure" for surgical treatment of hemorrhoids, which is designed for coagulation and vascular cross-section of more than 7 mm in diameter, which provides controlled energy supply to tissues and reliable hemostasis. The basic mechanism is melting of collagen and elastin with the formation of a dense film of the "welded zone" type, which separates the wound from the external environment, preventing its infection. In addition, there is no need to isolate and treat the vascular leg of the hemorrhoid, so this method of hemorrhoidectomy is called "closed sutureless hemorrhoidectomy". The depth of thermal impact on the tissues when using this system is 2 mm [4]. But, unfortunately, this technique had a number of disadvantages: intensive pain (11.7%), recurrence of diseases (7.5%), postoperative bleeding (2.1-7.1%), anal stricture (2.1 - 2.8%) [5,15].

The Ultra Cision ultrasonic harmonic scalpel from Ethicon Endo-Surgery (USA) is widely used in coloproctology. The principle of operation is based on the oscillation of the working nozzle, which leads to the destruction of hydrogen compounds in the protein structures of collagen and their bonding. As a result, there is coagulation of the lumen of blood vessels up to 5 mm in diameter, and the depth of thermal impact on the tissues does not exceed 1.5 mm [4,9]. These properties make it possible to perform surgery without vascular stitching with minimal thermal impact on the tissues of the anal canal, which reduces the duration of the operation. However, this method is accompanied by the occurrence of postoperative bleeding (2.1-6.1%), severe pain (5-7.6%), dysuric disorders (5%), prolonged healing of postoperative wounds (6%) and recurrence of diseases (9.1%) [10-12].

Over the last decade, there have been increasing publications on the use of laser technology in the treatment of non-neoplastic diseases of the anal canal and rectum [2,7]. The use of a "laser scalpel" is based on the direct mechanical impact of high-intensity irradiation, which allows you to cut and "weld" fabrics. Infrared laser irradiation of the spectrum reduces inflammatory changes in postoperative wounds and reduces pain, by stimulating the metabolic activity of cells and enhancing their regeneration processes [4]. However, studies on the use of laser for the treatment of hemorrhoids have shown that this method is accompanied by prolonged healing of postoperative wounds, which is probably due to the deep thermal effect on the tissues, which can sometimes reach 4.2 mm and the need for additional stitching vessels due to the risk of bleeding [4,6]. In addition, a number of studies have demonstrated the ineffectiveness of laser technology in chronic hemorrhoids stage III-IV and in chronic anal fissure due to severe inflammatory and scarring in the anal canal [13,14].

Thus, the urgency of the problem of combined pathology of the anal canal and rectum is quite high and contributes to the creation and implementation in practice of coloproctologists modern minimally invasive and highly effective methods of surgical treatment of this pathology, which would have minimal tissue damage, ensure no complications and recurrences, reduced the duration of inpatient treatment of patients and would promote their rapid medical and social rehabilitation.

The aim was to conduct a comparative evaluation of the effectiveness of high-frequency electrosurgical devices "ERBE ICC 200", "EFA", "KLS Martin", as well as the device of radio wave surgery "Surgitron" in the treatment of combined pathology of the anal canal and rectum.

Material and methods. Between January 2007 and March 2020, the proctology department of Khmelnytskyi regional hospital operated on 635 patients with combined pathology of the anal canal and rectum using high-frequency electrosurgical devices "ERBE ICC 200", "EFA", "KLS Martin" and the device of radio-wave surgery "Surgitron". Of these, 358 (56.4%) patients were male and 277 (43.6%) patients were female. The age of patients ranged from 18 to 76 years.

Thus, for the period from March 2008 to February 2019 in the proctology department of Khmelnytskyi regional hospital 169 patients with combined pathology of the anal canal and rectum were operated using high-frequency electrosurgery device "ERBE ICC 200", which formed the first study group. 104 (61,5%) patients were male and 65 (38.5%) were female. The age of patients ranged from 20 to 76 years.

In the first study group, all patients underwent surgery using a high-frequency electrosurgery device "ERBE ICC 200". At the heart of this device with an output frequency of 330 KHz and a nominal power of 50 - 80 W at 200 - 500 Ohms, there is a system of automatic power control that recognizes low-impedance loads, regulating the high-frequency generator, due to which the quality of the tissue section and the required intensity of high-frequency voltage is ensured.

In the period from January 2007 to February 2019, 114 patients with combined pathology of the anal canal and rectum were operated on in the proctology department of Khmelnytskyi regional hospital using the high-frequency electrosurgery device "EFA", which was the second study group. Of these, 65 (57%) patients were male and 49 (43%) were female. The age of patients ranged from 24 to 72 years.

In the second study group, surgery was performed on all patients using a high-frequency electrosurgery device "EFA". This device has a system of adaptive control of the output high-frequency voltage depending on the resistance of the tissue with the stabilization of the output power, which is 200W at a frequency of 375kHz in a wide range of loads (from 100 to 2000Ohm). This unique feature of the device allows to carry out an electrotomy and electro coagulation with the maximum effect and the minimum necrosis of tissues, and also allows to use it in liquid environments.

In the period from October 2017 to March 2020, 107 patients with combined pathology of the anal canal and rectum were operated on in the proctology department of Khmelnytskyi regional hospital using the "KLS Martin" high-frequency electrosurgery device, which was the third study group. 43 of them (40.2%) patients were male and 64 patients (59.8%) were female. The age of patients ranged from 19 to 65 years.

In the third study group, surgery was performed on all patients using a device of high-frequency electro surgery "KLS Martin ME MB1". An important feature of this electrosurgical complex with an output frequency of 450 kHz is the presence of a mixed cutting mode with marginal coagulation effect, as well as a "spray-coagulation" mode, which provides fast and uniform hemostasis with minimal carbonization, which improves wound healing and prevents deep necrosis.

Between September 2009 and February 2019, the proctology department of Khmelnytskyi regional hospital operated on 245 patients with combined pathology of the anal canal and rectum using the "Surgitron" radio-wave surgery apparatus, which formed the fourth study group. Of these, 143 (58.4%) patients were male and 102 (41.6%) were female. The age of patients ranged from 18 to 74 years.

In the fourth study group, surgery was performed on all patients using a radio-wave surgery device "Surgitron F.F.P.F. EMC". The basis of this device is the effect of converting electric current on a radio wave with an output frequency of 3.8-4.0 MHz, under the influence of which the cut tissue resists the penetration of radio waves, while emitting heat, under the influence of which tissue cells in the path waves, disintegrate and evaporate, and the tissue seems to "disperse". This feature of the device of radio-wave surgery with the above-stated frequency of waves causes soft influence on fabrics with their minimum damage.

All 635 patients, who were divided into 4 study groups, signed a voluntary informed consent for anesthesia and surgery, which were performed under spinal anesthesia.

After surgical interventions using high-frequency electro surgery devices "ERBE ICC 200", "EFA", "KLS Martin", as well as the radio-wave surgery device "Surgitron", all patients from each study group underwent morphological examination of tissues to study the depth of their necrosis.

The operating material was fixed in 10% neutral formalin solution. Next, the material was produced in a carousel histoprocessor type STP-120, for filling paraffin blocks used EC-350 station, for cutting paraffin blocks - rotary microtome series HM - 340E, for staining histological specimens - Robot-Stain-

erHMS-740 (all devices from Carl Zeiss MICROM International GmbH). The drugs were stained with hematoxylin and eosin. An Axioskop 40 microscope with an AxioCamMRc5 camera (Karl Zeiss) was used.

Measurement of the thickness of layer of coagulation necrosis was performed using an eyepiece-micrometer scale.

Statistical analysis of the obtained data was performed using IBM SPSS Statistics software 21. Verification of the distribution of normality was performed using the Kolmogorov-Smirnova criteria, as amended by Lillefors and Shapiro-Wilk. Median, 25th and 75th percentiles were given for descriptive statistics of Kruskal-Wallis H-test (critical significance level - 0.05) was used for group comparison, and Mann-Whitney criterion was used for pair wise comparison of groups (critical significance level - 0.0085).

Results and discussion. In the course of the study it was found that in the first study group in 132 patients (78.1%) 2 diseases were detected, in 35 (20.7%) - 3 diseases, in 2 (1.2%) - 4 diseases of canal and rectum.

The most common variants of combined pathology of the anal canal and rectum: chronic anal fissure and anal polyp - in 18 (10.6%) patients, chronic anal fissure and combined hemorrhoids - in 14 (8.3%) patients, combined hemorrhoids and anal polyp in 14 (8.3%) patients, combined hemorrhoids and chronic anal fistula in 13 (7.7%) patients, chronic anal fissure, anal polyp and hypertrophied perianal skin tags in 5 (2.9%) patients, combined hemorrhoids, chronic anal fissure and anal polyp - in 5 (2.9%) patients, external hemorrhoids and anal polyp - in 4 (2.4%) patients.

The nature of the performed surgical interventions depended on the variant of combined pathology of the anal canal and rectum. The most common combinations of surgical interventions were performed: anal fissure excision + polypectomy - 18 (10.6%), hemorrhoidectomy + anal fissure excision - 14 (8.3%), hemorrhoidectomy + polypectomy - 14 (8.3%), hemorrhoidectomy + excision anal fistula - 13 (7.7%), anal fissure excision + polypectomy + electroexcision of hypertrophied perianal skin tag - 5 (2.9%), hemorrhoidectomy + anal fissure excision + polypectomy - 5 (2.9%), hemorrhoidectomy + polypectomy - 4 (2.4%).

During the study in the second study group in 85 patients (74.5%) 2 diseases were detected, in 26 (22.8%) - 3 diseases, in 3 (2.7%) - 4 diseases of the anal canal and rectum.

The most common variants of combined pathology of the anal canal and rectum: chronic anal fissure and anal polyp - in 27 (23%) patients, chronic anal fissure and combined hemorrhoids - in 22 (19%) patients, combined hemorrhoids and chronic anal fistula - in 18 (16%) patients, combined hemorrhoids and anal polyp - in 15 (13%) patients, chronic anal fissure, anal polyp and hypertrophied perianal skin tags - in 8 (7%) patients, combined hemorrhoids, chronic anal fissure and anal polyp - in 8 (7%) patients, external hemorrhoids and anal fistula - in 6 (5%) patients, anal fistula and anal polyp - in 6 (5%) patients, chronic internal hemorrhoids of III stage and chronic anal fissure - in 4 (3%) patients.

The following combinations of surgical interventions were performed in patients of this study group: anal fissure excision and polypectomy in 27 (23%) patients, anal fissure excision and hemorrhoidectomy in 22 (19%), hemorrhoidectomy and anal fistula excision in 18 (16%), hemorrhoidectomy and polypectomy - in 15 (13%), anal fissure excision, polypectomy, electroexcision of hypertrophied perianal skin tag - in 8 (7%), hemorrhoidectomy, anal fissure excision, polypectomy - in 8 (7%),

hemorrhoidectomy and anal fistula excision in 6 (5%), excision of anal fistula and polypectomy in 6 (5%), hemorrhoidectomy and excision of anal fissure in 4 (3%).

During the study in the third study group it was found that 68 patients (63.5%) had 2 diseases, 32 (29.9%) - 3 diseases, 6 (5.6%) - 4 diseases, 1 (0.9%) - 5 diseases of the anal canal and rectum.

The most common in this group were the following variants of combined pathology of the anal canal and rectum: chronic anal fissure and anal polyp - in 20 (18.7%) patients, combined hemorrhoids and chronic anal fissure - in 13 (12.1%) patients, chronic anal fissure, anal polyp and hypertrophied perianal skin tags - in 12 (11.2%) patients, chronic anal fissure, anal polyp and combined hemorrhoids - in 9 (8.4%) patients, combined hemorrhoids and anal fistula - in 8 (7.5%) patients, external hemorrhoids and chronic anal fissure - in 6 (5.6%) patients, anal fistula and anal polyp - in 4 (3.7%) patients, anal polyp and hypertrophied perianal skin tags - in 4 (3.7%) patients, chronic anterior anal fissure, chronic posterior anal fissure and anal polyp - in 3 (2.8%) patients.

Patients of the third study group underwent the following types of combined operations in the most common variants of combined pathology: anal fissure excision and polypectomy - in 20 (18.7%) patients, hemorrhoidectomy and anal fissure excision - in 13 (12.1%) patients, excision anal fissure, polypectomy and electroexcision of hypertrophied perianal skin tag - in 12 (11.2%) patients, anal fissure excision, polypectomy and hemorrhoidectomy - in 9 (8.4%) patients, hemorrhoidectomy and anal fistula excision - in 8 (7, 5%) patients, hemorrhoidectomy and excision of the anal fissure - in 6 (5.6%) patients, excision of the anal fistula and polypectomy - in 4 (3.7%) patients, polypectomy and electroexcision of hypertrophied perianal skin tag - in 4 (3, 7%) of patients, excision of the anterior anal fissure, excision of the posterior anal fissure and polypectomy - in 3 (2.8%) patients.

As a result of the study it was found that in the fourth study group in 188 patients (76.7%) were found 2 pathologies, in 51 (20.8%) - 3 pathologies, in 6 (2.5%) - 4 pathologies of the anal canal and rectum.

The most common variants of combined pathology of the anal canal and rectum: chronic anal fissure and anal polyp - in 45 (18.4%) patients, chronic anal fissure and combined hemorrhoids - in 31 (12.6%) patients, combined hemorrhoids and anal polyp in 23 (9.4%) patients, combined hemorrhoids and anal fistula in 23 (9.4%) patients, external hemorrhoids and anal polyp in 18 (7.3%) patients, chronic anal fissure, anal polyp and

hypertrophied perianal skin tags in 13 (5.3%) patients, external hemorrhoids and chronic anal fissure in 12 (4.9%) patients, combined hemorrhoids, chronic anal fissure and anal polyp in 10 (4.1%) patients, external hemorrhoids, chronic anal fissure and anal polyp - in 10 (4.1%) patients, anal polyp and hypertrophied perianal skin tags - in 10 (4.1%) patients.

Patients in the fourth study group underwent the following types of combined operations: anal fissure excision and polypectomy in 45 (18.4%) patients, anal fissure excision and hemorrhoidectomy in 31 (12.6%) patients, hemorrhoidectomy and anal fistula excision in 23 (9.4%) patients, hemorrhoidectomy and polypectomy - in 23 (9.4%) patients, hemorrhoidectomy and polypectomy - in 18 (7.3%) patients, anal fissure excision, polypectomy and electroexcision of hypertrophied perianal skin tag - in 13 (5.3%) patients, hemorrhoidectomy and anal fissure excision - in 12 (4.9%) patients, hemorrhoidectomy, anal fissure excision and polypectomy - in 10 (4.1%) patients, hemorrhoidectomy, anal fissure excision and polypectomy - in 10 (4.1%) patients, polypectomy and electroexcision of hypertrophied perianal skin tag - in 10 (4.1%) patients.

Comparative characteristics of high-frequency electrosurgical devices "ERBE ICC 200", "EFA" and "KLS Martin", as well as the device of radio-wave surgery "Surgitron" in the surgical treatment of patients with combined pathology of the anal canal and rectum are shown in Table 1, which shows 25th and 75th percentiles, as well as minimum and maximum values.

According to the results of the comparison of groups due to the Kruskal-Wallis test, the difference between the groups is statistically significant for all parameters ($p < 0.001$). A pair wise comparison of groups according to the Mann-Whitney test revealed no statistically significant difference between the 3rd and 4th groups in terms of duration of surgery and severity of pain; the volume of blood loss did not reveal a statistically significant difference between the 2nd, 3rd and 4th groups; the parameter depth of the coagulation necrosis layer did not reveal a statistically significant difference between the 2nd and 3rd groups. Among other pairs of groups, statistically significant differences were found at the level of significance $p < 0.001$.

In the morphological study it was found that when using the device of high-frequency electro surgery "ERBE ICC 200" in patients of the first study group tissue incision was due to their dissection and coagulation with control of hemostasis and the formation of thin layer coagulation necrosis median thickness of which was 0.303 mm (Fig. 1).

Table 1. Comparative characteristics of the use of modern surgical technologies in the treatment of combined pathology of the anal canal and rectum

Comparison criteria	"ERBE" ICC 200 (n=169)	"EFA" (n=114)	"KLS Martin" (n=107)	"Surgitron" (n=245)
Duration of operation (min.)	20 (17-23)	25 (22-28)	16 (13-18)	17 (14-19)
Volume of blood loss (ml)	14 (10-19)	20 (17-22)	20 (16-24)	20 (15-25)
The severity of pain (the need for narcotic analgesics - ml)	3 (2-3)	2 (2-3)	2 (2-2)	2 (1-2)
Duration of inpatient treatment (days)	6 (5-7)	5 (4-6)	4 (3-5)	4 (3-4)
Depth of coagulation necrosis layer (mm)	0,303 (0,193-0,383) [0,113-0,457]	0,212 (0,138-0,319) [0,074-0,434]	0,196 (0,100-0,280) [0,053-0,333]	0,158 (0,092-0,173) [0,037-0,297]

The table shows the values of the medians, in parentheses are the 25th and 75th percentiles, and in square brackets - the minimum and maximum values

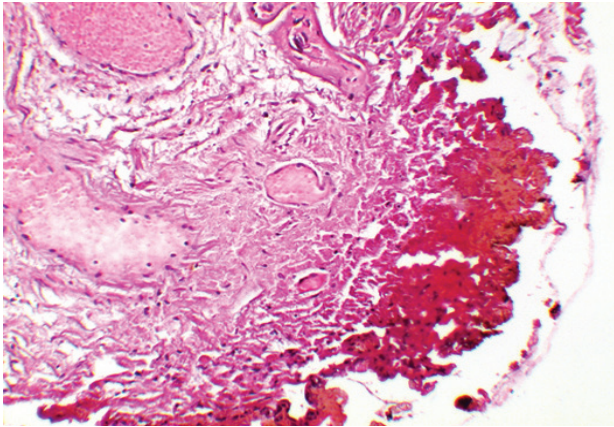


Fig. 1. The edge of the incision by the device of high-frequency electro surgery "ERBE ICC200" - preservation of the tissue structure with the formation of a thin layer of coagulation necrosis along the edge of the incision. Stained with hematoxylin and eosin. Magnification X 100

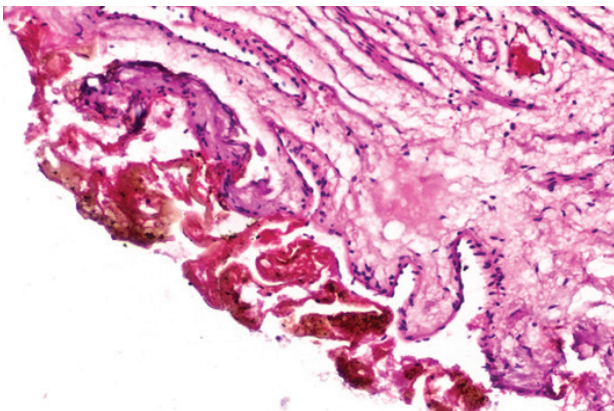


Fig. 2. The edge of the incision with a device of high-frequency electro surgery "EFA" - preservation of the tissue structure with the formation along the edge of the incision of a thin layer of coagulation necrosis. Stained with hematoxylin and eosin. Magnification X 100

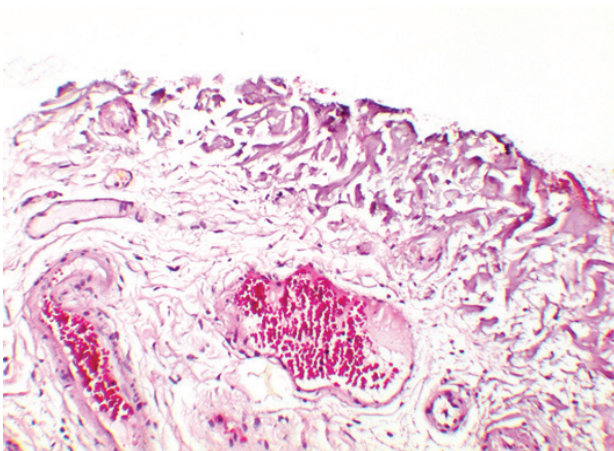


Fig. 3. The incision edge of the high-frequency electro surgical device "KLS Martin" - preservation of the tissue structure by creating along the incision of a thin layer of coagulation necrosis. Stained with hematoxylin and eosin. Magnification X 100

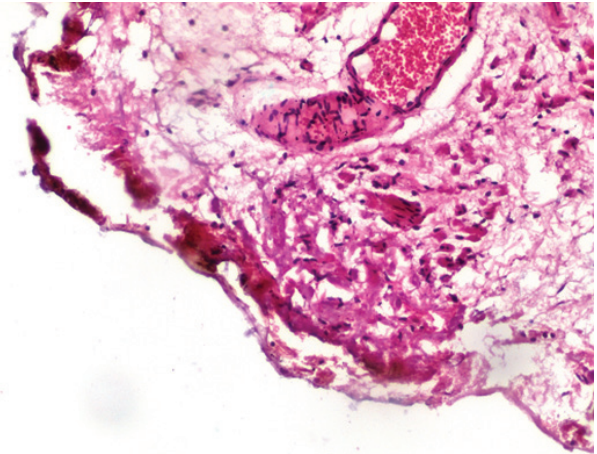


Fig. 4. Edge of the incision when using the equipment of radio-wave surgery "Surgitron" - preservation of the tissue structure by creating a thin layer of coagulation necrosis along the edge of the incision. Stained with hematoxylin and eosin. Magnification X 100

In the morphological examination of tissues after the use of high-frequency electro surgical device "EFA" in patients of the second study group, it was found that a thin layer of coagulation necrosis was formed, the median thickness of which was 0.212 mm (Fig. 2).

When using a high-frequency electro surgical device "KLS Martin" in patients of the third study group, tissue preservation is observed with the formation of a thin layer of coagulation necrosis with a median thickness of 0.196 mm along the edge of the incision (Fig. 3).

The use of radio-wave device "Surgitron" in patients of the fourth study group helped to preserve the tissue structure by creating an incision in the thinnest layer of coagulation necrosis, the median depth of which was 0.158 mm (Fig. 4).

The use of the "Surgitron" radiosurgery device for the treatment of patients with combined pathology of the anal canal and rectum was accompanied by the formation of the thinnest layer of coagulation necrosis in the tissues, the depth of which ranged from 0.037 to 0.297 mm due to which the patients of the fourth study group had the least severe pain and they needed 1-2 ml of narcotic analgesics for analgesia, contributing to reduce inpatient treatment for up to 3-4 days.

The obtained data confirm the existing opinion that the use of radio-wave surgery devices is accompanied by minimal thermal damage to tissues with a depth of coagulation necrosis up to 0.05 mm, which creates favorable conditions for wound healing [3].

The use of high-frequency electro surgery device "KLS Martin" was also accompanied by the formation of a thin layer of coagulation tissue necrosis with a depth of 0.053 to 0.333 mm, so that patients in the third study group had mild pain and they needed 2 ml of narcotic analgesics for analgesia which helped to reduce inpatient treatment to 3-5 days.

When using the device of high-frequency electro surgery "EFA" formed a deeper layer of coagulation necrosis of tissues with a depth of 0.074 to 0.434 mm, so that patients in the second study group had more severe pain and they needed for analgesia 2-3 ml of narcotic analgesics, which led to a longer period inpatient treatment, which was 4-6 days.

The effect on the tissues of the high-frequency electro surgery device "ERBE ICC 200" was accompanied by the formation of

the deepest layer-coagulation necrosis with a depth of 0.113 to 0.457 mm, so that patients in the first study group had the lowest blood loss among all groups, 10-19 ml, but most severe pain and they needed for analgesia 3 ml of narcotic analgesics, which was accompanied by the longest period of inpatient treatment, which was 5-7 days.

The obtained results of application of all above-mentioned high-frequency (with a frequency of 330 kHz in “ERBE ICC 200” to 450 kHz in “KLS Martin”) electrosurgical devices testify that even the greatest depth of coagulation necrosis which they cause (from 0,333 to 0,457 mm), is significantly smaller compared to the use of advanced surgical technologies such as ultrasonic harmonic scalpel “UltraCision” and bipolar electrothermal system “LigaSure”, the depth of thermal impact on tissues which, according to some authors, is 1.5 mm and 2 mm, respectively, which is often accompanied by scarring strictures of the anal canal [4,5,9]. In addition, the obtained data indicate that the greatest depth of coagulation necrosis obtained when using the device “ERBE ICC 200” with a thickness of 0.457 mm is much smaller than described by some authors [3], it can be when using monopolar or bipolar coagulation, sometimes reaching even 9mm. Also obtained as a result of the study, the greatest depth of coagulation necrosis is less than with modern laser technology, the depth of thermal impact on tissues which can sometimes reach 4.2 mm, accompanied by a longer healing time of postoperative wounds [2,6].

Due to the minimal and insignificant impact on the tissues when using the radio-wave surgery device “Surgitron”, as well as the devices of high-frequency electrosurgery “ERBE ICC 200”, “EFA” and “KLS Martin”, no scarring of the anal canal and deformations of the pararectal areas were detected in any patient, which contributed to the cosmetic nature of the combined operations and led to the rapid rehabilitation of patients in the study groups.

Conclusions. 1. The use of high-frequency electrosurgery devices «ERBE ICC 200», “EFA”, “KLS Martin”, as well as the device of radio-wave surgery “Surgitron” for the treatment of combined pathology of the anal canal and rectum prevented scarring strictures of the anal canal and scarring pararectal deformations due to insignificant tissue necrosis, which ranged from 0.037 to 0.457 mm, contributing to the formation of a delicate elastic scar and causing the cosmeticity of combined operations.

2. The use of these modern radiosurgical and electrosurgical technologies, due to the minimal and insignificant impact on the tissues, reduces the duration of the operation, the severity of postoperative pain, improving the rehabilitation of patients.

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SUMMARY

THE RESULTS OF SURGICAL TREATMENT OF COMBINED ANORECTAL DISEASES USING RADIO-FREQUENCY AND HIGH-FREQUENCY ELECTROSURGICAL DEVICES

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The combined pathology of the anal canal and rectum is a very important problem today, due to its progressive growth, especially in industrialized countries over the past two or three decades.

The aim of the study was to conduct a comparative assessment of using high-frequency electrosurgical devices and also radio-frequency device for treatment of combined anal canal and rectal pathology.

The results of treatment of 635 patients with combined anal canal and rectal diseases have been analyzed. Using high-frequency electrosurgical device “ERBE ICC 200” (ERBE

Elektromedizin GmbH, Germany) have been operated on 169 (26,6%) patients, high-frequency electrosurgical device “EFA” (Russia) - 114 (17,9%) patients, high-frequency electrosurgical device “KLS Martin” (KLS Martin Group, Germany)-107 (16,9%) patients and radio-frequency device “Surgitron” (Ellman International, USA) - 245 (38,6%) patients. After operations for assessment the effectiveness of using the above technologies all patients in each group were underwent to morphological investigations of anal canal and rectal tissues to study the depth of coagulation necrosis.

In case of using of the high-frequency electrosurgical device “ERBE ICC 200” the incision of tissues occurred with formation of coagulation necrosis layer, which thickness was 0,113-0,457mm, in case of using high-frequency electrosurgical device “EFA” a layer of coagulation necrosis formed with thickness 0,074-0,434mm, in case of using high-frequency electrosurgical device “KLS Martin” forms a thin layer of coagulation necrosis in the thickness along the edge of the cut 0,053-0,333 mm and using of radio-frequency device “Surgitron” was accompanied with the formation on the cut edge of a thin coagulation necrosis layer with depth 0,037-0,297mm.

Application of these modern radio-frequency and high-frequency technologies, due to the minimal and slight influence on tissues, contributes to reducing the operations duration, intensity of the postoperative pain, improving the terms of patients rehabilitation.

Keywords: combined pathology, anal canal, rectum, radio – wave surgery device, high – frequency electrosurgical devices.

РЕЗЮМЕ

РЕЗУЛЬТАТЫ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ СОЧЕТАННЫХ АНОРЕКТАЛЬНЫХ ЗАБОЛЕВАНИЙ С ИСПОЛЬЗОВАНИЕМ РАДИОХИРУРГИЧЕСКИХ И ВЫСОКОЧАСТОТНЫХ ЭЛЕКТРОХИРУРГИЧЕСКИХ АППАРАТОВ

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Сочетанная патология анального канала и прямой кишки по сей день является весьма значимой проблемой, учитывая её прогрессивное увеличение, особенно в индустриальных странах за последние 2-3 десятилетия.

Целью исследования явилась сравнительная оценка эффективности применения высокочастотных электрохирургических аппаратов и аппарата радиоволновой хирургии в лечении сочетанной патологии анального канала и прямой кишки.

Проанализированы результаты лечения 635 пациентов с сочетанной патологией анального канала и прямой кишки. С использованием аппарата высокочастотной электрохирургии “ERBE ICC 200” (ERBE Elektromedizin GmbH, Германия) прооперировано 169 (26,6%) больных, аппаратом высокочастотной электрохирургии “ЭФА” (ООО «ЭФА», Российская Федерация) – 114 (17,9%) больных, аппаратом высокочастотной электрохирургии “KLS Martin” (KLS Martin Group, Германия) – 107 (16,9%) больных и аппаратом радиоволновой хирургии “Surgitron” (Ellman International, США) – 245 (38,6%) больных. После оперативных вмеша-

тельств для оценки эффективности применения вышеуказанных технологий всем пациентам проводилось морфологическое исследование тканей анального канала и прямой кишки с целью изучения глубины их некроза.

При использовании аппарата высокочастотной электрохирургии “ERBE ICC 200” разрез тканей происходил с образованием слоя коагуляционного некроза, толщина которого составляла 0,113-0,457 мм, при использовании высокочастотного электрохирургического аппарата “ЭФА” образовывался слой коагуляционного некроза, толщина которого равнялась 0,074-0,434 мм, при использовании электрохирургического аппарата “KLS Martin” по краю разреза образовывался тонкий слой коагуляционного некроза толщиной 0,053-0,333 мм, а применение радиоволнового устройства “Surgitron” сопровождалось образованием по краю разреза тонкого слоя коагуляционного некроза, глубина которого составляла 0,037-0,297 мм.

Применение вышеуказанных современных радиохирургических и электрохирургических технологий, благодаря минимальному и незначительному влиянию на ткани, уменьшает продолжительность операции, интенсивность послеоперационного болевого синдрома, сокращает сроки реабилитации пациентов.

რეზიუმე

შერწყმული ანორექტული დაავადებების ქირურგიული მკურნალობის შედეგები რადიოქირურგიული და მაღალსიხშირული ელექტროქირურგიული აპარატების გამოყენებით

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ანალური არხის და სწორი ნაწლავის შერწყმული პათოლოგია სადღეისოდ, მისი პროგრესული ზრდის გათვალისწინებით, განსაკუთრებით – ინდუსტრიულ ქვეყნებში უკანასკნელი 2-3 ათეული წლის განმავლობაში, მეტად მნიშვნელოვან პრობლემას წარმოადგენს.

კვლევის მიზანს შეადგენდა მაღალსიხშირული ელექტროქირურგიული აპარატების და რადიოტალღური ქირურგიის აპარატის გამოყენების ეფექტურობის შედარებითი შეფასება ანალური არხის და სწორი ნაწლავის შერწყმული პათოლოგიის ქირურგიული მკურნალობის დროს.

გაანალიზებულია ანალური არხის და სწორი ნაწლავის შერწყმული პათოლოგიის მქონე 635 პაციენტის მკურნალობის შედეგები. მაღალსიხშირული ელექტროქირურგიის აპარატის “ERBE ICC 200” (ERBE Elektromedizin GmbH, გერმანია) გამოყენებით ნაოპერაციებია 169 (26,6%) ავადმყოფი, მაღალსიხშირული ელექტროქირურგიის აპარატით “ЭФА” (რუსეთი) – 114 (17,9%) ავადმყოფი, მაღალსიხშირული ელექტროქირურგიის აპარატით “KLS Martin” (KLS Martin Group, გერმანია) – 107 (16,9%) ავადმყოფი, რადიოტალღური ქირურგიის აპარატით “Surgitron” (Ellman International, აშშ) – 245 (38,6%) ავადმყოფი. აღნიშნული ტექნოლოგიების გამოყენების ეფექტურობის შეფასებისათვის

ოპერაციული ჩარევის შემდეგ ყველა პაციენტს ჩატარდა ანალური არხის და სწორი ნაწლავის ქსოვილების მორფოლოგიური კვლევა ამ უკანასკნელთა ნეკროზის სიღრმის შეფასების მიზნით.

მაღალსისწირული ელექტროქირურგიის აპარატის “ERBE ICC 200” გამოყენებისას ქსოვილების გაკვეთა ხორციელდებოდა კოაგულაციური ნეკროზის ფენის წარმოქმნით, რომლის სისქე შეადგენდა 0,113-0,457 მმ-ს, მაღალსისწირული ელექტროქირურგიის აპარატის “ЭФА” გამოყენებისას წარმოიქმნებოდა კოაგულაციური ნეკროზის ფენა, სისქით 0,074-0,434 მმ, ელექტროქირურგიული აპარატის “KLS Martin” გამოყენებისას

განაკვეთის კიდეზე წარმოიქმნებოდა კოაგულაციური ნეკროზის თხელი ფენა, სისქით 0,053-0,333 მმ, რადიოტალღური მოწყობილობა “Surgitron”-ის გამოყენებას კი მოსდევდა განაკვეთის კიდეზე კოაგულაციური ნეკროზის თხელი, 0,037-0,297 მმ სისქის ფენის წარმოქმნა.

ზემოაღნიშნული თანამედროვე რადიო და ელექტროქირურგიული ტექნოლოგიების გამოყენება, ქსოვილებზე მინიმალური და უმნიშვნელო გავლენის საშუალებით ამცირებს ოპერაციის ხანგრძლივობას, პოსტოპერაციული ტკივილის სინდრომის ინტენსიურობას და პაციენტების რეაბილიტაციის ვადებს.

COMPARISON OF THE PATIENT-CONTROLLED EPIDURAL AND INTRAVENOUS ANALGESIA AFTER OPEN COLORECTAL SURGERY: A RANDOMIZED CONTROLLED TRIAL

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Colorectal surgeries are associated to severe postoperative pain, long hospital stays and prolonged recovery time. Postoperative analgesia is one of main parameter in patient management. It has an impact on respiratory, cardiovascular and endocrine systems [1,2]. Considering all these, adequate perioperative analgesia shows an improvement in clinical outcomes, avoids complications, reduces hospital stay and because of all these parameters increases patient's satisfaction rate [3-7].

Choosing the best option of analgesia for colorectal surgeries still remains the task of different discussions and trials, because it is difficult to achieve adequate analgesia considering all adverse effects, risks and benefits of each method. It depends on multiple factors [8]. Intravenous analgesia (IVA) with opioids and epidural analgesia (EA) are the most popular techniques for colorectal surgeries, but patient controlled methods become more and more popular during last few years, when the patient controls his own analgesia through the use of an electronic controller.

Patient controlled techniques allow patients to self-administer small boluses of analgesics, providing better titration and enhancing responsiveness in analgesic requirements [9-11]. Patient-controlled analgesia has been proposed as a safe and effective technique for postoperative analgesia and is considered to be the “gold standard” for pain relief after major surgeries [12,13].

During intravenous patient-controlled analgesia (IVPCA) with opioids, when the patient needs more analgesia, he pushes a button and will receive a predetermined small dose of opioid into the venous line. Opioids via IVPCA gives us ability to improve analgesia level compared to nurse-delivered IM opioids, while the risks of sedation, hypoventilation and nausea are almost similar [14].

During epidural analgesia local anesthetics are being administered continuously at a rate set by clinician and also bolus doses according to patient's requirements through the catheter-which is placed in the epidural space [15]. It is thought to reduce the sympathetic stress response associated with surgery. Also, it has potential benefits which include earlier gastrointestinal recovery [16] decreased respiratory and cardiovascular complications [17, 18].

Patient-controlled epidural analgesia and intravenous analgesia methods, both use the agents, which have good analgesic characteristics. The goal of this study was to determine the benefits and side effects of each method. Intravenous analgesia (IVA) with opioids PCEA seems to have less side effects which are associated to opiates, for example respiratory complications and sedation (delays patient activation and early recovery), while it can reach excellent analgesia [19]. But it is invasive procedure, needs special high-level skills and it is more expensive as well [20].

It should be mentioned, that education of patients regarding the objectives and potential risks of pain therapy is an important aspect of pain management, that can lead to improved postoperative analgesia. [21,22]. Preparing patients with accurate information as to what to expect postoperatively, including a possible level of postoperative discomfort and the availability of effective medication, may improve postoperative satisfaction and overall compliance with the initial pain control plan. [23,24]

The increasing use of minimally invasive techniques and fast track protocols have questioned the position of patient-controlled epidural analgesia as the optimal method of pain management after major abdominal surgery. We therefore performed a prospective randomized study in adult patients undergoing colorectal surgeries to compare the effectiveness on pain and safety of two techniques of anesthesia and analgesia: combined epidural analgesia and general anesthesia followed by postoper-