

# CLINICAL EFFICACY OF THE USE OF ENRICHED AUTOPLASMA IN PATIENTS WITH HEMORRHOIDECTOMY

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## Abstract

**Purpose.** Our research explores the effect of the use of PRP therapy in accelerated recovery and wound healing after hemorrhoidectomy.

**Material and methods.** A study based on the results of the treatment of patients with chronic hemorrhoids who were treated from January 2021 to January 2022 was conducted based on the surgical department of the RDC and MIPO Clinics LLP. The study included 100 patients aged 21 to 72 years with chronic hemorrhoids of stage II and III, in the treatment of which the method of hemorrhoidectomy with PRP therapy (main group) and open hemorrhoidectomy (control group) was used. In the analysis of clinical efficacy, the severity and duration of pain syndrome, manifestations of complications in the early postoperative period, cytomorphological analysis of fingerprint smears, the number of bed days spent, and the period of recovery were used. An analysis of the assessment of the quality of life of patients after surgery in the long-term period was also carried out.

**Results.** The intensity of pain severity was estimated at an average of  $3 \pm 0.2$  points in the main group and  $6.1 \pm 0.3$  points in the control comparison group. The duration of pain continuation after surgery averaged  $3.1 \pm 0.2$  days in the main group and  $4.4 \pm 0.2$  days in the control comparison group. The development of early postoperative complications in the main group – in 6 (12%), in the control group were diagnosed in 14 (28%) cases. When assessing the dynamics of the wound process according to the cytological picture, it was noted that the neutrophil reaction was more pronounced in the control group. In the main group, epithelization elements appeared faster (from the 10th day - in 35%). The average epithelialization time was  $31.1 \pm 2.2$  days in the control group compared to  $20.3 \pm 3.9$  days in the main group. In the main group, by day 15, 31 (62%) patients and by day 25, 50 (100.0%) all patients returned to work. In the control group, 32 (64%) patients started working by day 30 and 100% by day 40.

**Conclusion.** Taking into account the results of the study, the use of an integrated approach with the use of PRP therapy in the treatment of chronic hemorrhoids is recommended. It is shown that the use of the proposed patented treatment regimen leads to a decrease in postoperative pain syndrome, accelerated wound healing, and a decrease in the number of complications.

<https://doi.org/10.35805/BSK20231008>  
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**Conflict of interest:**  
Authors declare no conflict of interest

**Keywords:**  
chronic hemorrhoids, hemorrhoidectomy, Platelet-rich plasma – PRP, postoperative management.

## Геморроидэктомия кезінде пациенттерде байытылған аутоплазманы қолданудың клиникалық тиімділігі

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## Тұжырым

**Мақсаты.** Геморроидэктомиядан кейін жараларды жедел қалпына келтіру және емдеуде PRP терапиясын қолданудың әсерін зерттеу болып табылады.

**Материалдар және әдістері.** 2021 жылғы қаңтардан 2022 жылғы қаңтарға дейін емделген созылмалы геморроймен ауыратын науқастарды емдеу нәтижелеріне негізделген зерттеу РДО хирургиялық бөлімшесі мен ЖШС "МИПО клиникасы" базасында жүргізілді. Зерттеуге

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**Түйінді сөздер:**  
созылмалы геморрой, геморроидэктомия, Platelet-rich plasma-PRP, операциядан кейінгі емдеу.

PRP терапиясымен (негізгі топ) геморроидэктомия әдісін және ашық геморроидэктомияны (бақылау тобы) емдеуде қолданған II және III сатыдағы созылмалы геморройы бар 21-72 жас аралығындағы 100 пациент енгізілді. Клиникалық тиімділікті талдау кезінде ауырсыну синдромының ауырлығы мен ұзақтығы, операциядан кейінгі ерте кезеңдегі асқынулардың көрінісі, жара бетінің жағындыларының цитоморфологиялық талдауы, төсек күндерінің саны және еңбекке қабілеттілікті қалпына келтіру кезеңі қолданылды. Сондай-ақ, алыс кезеңдегі операциядан кейінгі пациенттердің өмір сүру сапасын бағалауға талдау жасалды.

**Нәтижелер.** Ауырсыну ауырлығының қарқындылығы, негізгі топта орташа есеппен  $3 \pm 0,2$  балл және салыстыру бақылау тобында  $6,1 \pm 0,3$  балл болды. Операциядан кейінгі ауырсынуудың ұзақтығы негізгі топта орта есеппен  $3,1 \pm 0,2$  тәулікті және салыстырудың бақылау тобында  $4,4 \pm 0,2$  тәулікті құрады. Негізгі топтағы операциядан кейінгі ерте асқынулардың дамуы-6 (12%), бақылау тобында 14 (28%) белгіленді. Цитологиялық көрініс бойынша жара процесінің динамикасын бағалау кезінде бақылау тобында нейтрофильді реакция айқынырақ болғандығы атап өтілді. Негізгі топта эпителизация элементтері тезірек пайда болды (10-шы күннен бастап – 35%). Эпителизацияның орташа мерзімдері негізгі топтағы  $20,3 \pm 3,9$  күнмен салыстырғанда  $31,1 \pm 2,2$  күн бақылау тобында болды. Негізгі топта 15 күнде 31 (62%) пациент және 25 күнде 50 (100,0%) науқастар жұмысқа қайта оралды. Бақылау тобында 30-шы күні 32 (64%) пациент және 40-шы күні 100% жұмысқа кірісті.

**Қорытынды.** Зерттеу нәтижелерін ескере отырып, созылмалы геморройды емдеуде PRP терапиясын қолдану арқылы кешенді тәсілді қолдану ұсынылады. Ұсынылған патенттелген емдеу режимін қолдану операциядан кейінгі ауырсыну синдромының төмендеуіне, жараларды емдеуді жеделдетуге және асқынулардың төмендеуіне әкелетіні көрсетілген.

## Клиническая эффективность применения обогащенной аутоплазмы у пациентов при геморроидэктомии.

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### Аннотация

**Цель.** Изучение влияния применения PRP терапии в ускоренном восстановлении и заживлении ран после геморроидэктомии.

**Материал и методы.** Исследование, основанное на результатах лечения пациентов с хроническим геморроем, находившихся на лечении с января 2021 г по январь 2022 гг, проведено на базе хирургического отделения РДЦ и ТОО «Клиники МИПО». В исследование было включено 100 пациентов в возрасте от 21 до 72 лет с хроническим геморроем II и III стадии, в лечении которых применялся метод геморроидэктомии с PRP терапией (основная группа), и открытая геморроидэктомия (контрольная группа). При анализе клинической эффективности применялись выраженность и длительность болевого синдрома, проявления осложнений в раннем послеоперационном периоде, цитоморфологический анализ мазков отпечатков, количество проведенных койко-дней и период восстановления трудоспособности. Также проведен анализ оценки качества жизни пациентов после операции в отдаленном периоде.

**Результаты.** Интенсивность выраженности болей, оценивалась в среднем  $3 \pm 0,2$  балла в основной группе и  $6,1 \pm 0,3$  балла в контрольной группе сравнения. Длительность продолжения болей после операции составила в среднем  $3,1 \pm 0,2$  суток в основной группе и  $4,4 \pm 0,2$  суток в контрольной группе сравнения. Развитие ранних послеоперационных осложнений в основной группе – у 6 (12%), в контрольной группе диагностированы в 14 (28%) наблюдениях. При оценке динамики раневого процесса по цитологической картине, отмечено, что в контрольной группе нейтрофильная реакция была более выражена. В основной группе быстрее (с 10-го дня – у 35%) появлялись элементы эпителизации. Средние сроки эпителизации были в контрольной группе  $31,1 \pm 2,2$  дня в сравнении с  $20,3 \pm 3,9$  дня в основной группе. В основной группе к 15 дню 31 (62%) пациентов и к 25 дню 50 (100,0%) все больные возвратились к труду. В контрольной группе к 30

**Конфликт интересов:**  
Авторы заявляют об отсутствии  
конфликта интересов

**Ключевые слова:**  
хронический геморрой,  
геморроидэктомия,  
Platelet-rich plasma – PRP,  
послеоперационное ведение.

дню 32 (64%) пациентов и к 40 дню 100% приступили к труду.

**Заключение.** Учитывая результаты исследования, рекомендовано применение комплексного подхода с применением PRP терапии при лечении хронического геморроя. Показано, что применение предложенной запатентованной схемы лечения приводит к уменьшению послеоперационного болевого синдрома, ускорению заживления ран, снижению числа осложнений.

### Introduction

According to the statistics of the Republican Center for Health Development in Almaty, in 2021 and 2022, 649 and 1119 operations were performed for acute and chronic hemorrhoids respectively. The most commonly used operations are hemorrhoidectomy and excision of hemorrhoids. According to these data, it can be noted that the number of operations increases every year [1]. Hemorrhoidal disease is the cause of significant economic costs and deterioration in the quality of life of the patient, but this disease is not studied enough by science. In the United States, hemorrhoidal disease is statistically the third most common gastrointestinal disease, with about 4 million visits to private clinics and emergency departments each year [2]. In the US, there was only one nationwide study on hemorrhoids, in 1989. In addition to the National Health Survey, participants were asked if they had ever been diagnosed with hemorrhoids by a doctor. When the survey data were extrapolated to the US population, there was an estimated 23 million adults (13% of the US population) were diagnosed with hemorrhoids last year. An estimated 36 million adults (20% of the US population) have ever been diagnosed with hemorrhoids [3].

According to various authors, complications after operations for chronic hemorrhoids range from 2 to 22% [1-4]. Even modern surgical technologies do not completely avoid bleeding and purulent-necrotic complications, the formation of rough cicatricial strictures in the postoperative period, the frequency of which can reach 20% [5,6]. At the present stage, the problem of the formation of an elastic scar in the postoperative stage is of particular importance [1,6,7]. The quality of the postoperative scar depends on the general condition of the body, the presence of undifferentiated connective tissue dystrophy in the patient, the stage of the disease, the experience of the surgeon, the type of suture material, the correct management of the patient in the postoperative period, and many other factors [5-7]. Proper management of the patient in the postoperative period is aimed at minimizing the negative consequences of surgical intervention and stabilizing the state of the body. Of particular importance is the absence of concomitant pathology, especially diabetes mellitus, and the addition of an infectious factor, which adversely affects the healing of postoperative wounds. All this can lead to a deviation from the deterministic algorithms for managing postoperative wounds [7]. According to the literature, the vascular and nervous network of the perianal region is very well

developed, but there is constant contamination of stool with bacteria and the lack of necessary oxygenation, and therefore wounds in this area heal more slowly compared to other anatomical regions. Any surgical intervention leads to disruption of local microcirculation in the operating area, which further leads to an inflammatory reaction. In the absence of sufficient blood supply to local tissues, there is a risk of complications developing around the wounds. Insufficient blood supply and seeding of perianal wounds and wounds of the anal canal lead to prolonged scar formation and deterioration of its quality [8,9]. Ways to improve the healing process of postoperative wounds in various areas are regularly studied and developed. Optimized methods of patient management are proposed to reduce the percentage of complications in the postoperative period and accelerate recovery processes.

The current stage of development indicates the need for further improvement of surgical treatment and optimization of methods for managing patients with chronic hemorrhoids, and the creation of uniform standards for providing care to this group of patients.

Of the many methods that affect accelerated healing and recovery, PRP therapy is one of the most optimized for the accelerated regeneration process. PRP therapy is based on the use of autologous platelet-rich plasma (PRP) for the treatment of various diseases. Most often used in the treatment of skin wounds - acute, chronic, and postoperative, especially with delayed regeneration [10-13]. According to the literature data, when using autologous platelet-rich plasma, complete epithelialization of the wound occurs significantly faster than when using traditional methods of treatment [14,15]. When studying scientific sources, it was noted that the use of PRP therapy accelerates the onset of complete epithelialization of the wound, has a positive effect in the prevention of early and late complications, significantly reduces postoperative pain in the early period, and shortens the rehabilitation period, and, not least, contributes to the formation of an elastic scar [16-18].

During a literary search, we found that the use of autoplasm in coloproctology and the implementation of the accelerated recovery program in a modern hospital have not been fully studied and consecrated. In this regard, the relevance of the comparative analysis of the results of the treatment of patients operated on for chronic hemorrhoids in Almaty from 2021 to 2022 is obvious.

**Aim:** Our study is to study the effect of the use of PRP therapy in the healing of wounds of the anal

canal and perianal area after hemorrhoidectomy.

#### Materials and methods

Based on the multidisciplinary surgical department of the regional diagnostic center and the proctology center of the IIPO Clinics LLP, we performed a comparative non-randomized prospective study based on the results of treatment of patients with chronic hemorrhoids who were hospitalized from January 2021 to January 2022. The study included 100 patients aged 21 to 72 years with stage II and III chronic hemorrhoids treated with hemorrhoidectomy with PRP therapy (main comparison group) and traditional surgical treatment of hemorrhoids - open hemorrhoidectomy (control comparison group). When conducting a comparative analysis of patients divided into groups by sex, age, duration of the disease history, stages of hemorrhoids, and risk factors for the development of the disease, it did not reveal statistically significant differences between the main and control groups of patients, which in turn allows for an objective assessment of the results of hemorrhoidectomy with PRP therapy compared with Milligan-Morgan hemorrhoidectomy.

In the analysis of the clinical effectiveness of operations, such evaluation criteria were used as the severity and duration of the pain syndrome, the manifestations, and severity of complications on time and in the early postoperative period, cytomorphological analysis of smears of prints, assess the course of the phases of the wound process, the number of bed-days spent in the hospital and the period restoration of the working capacity of patients, and as a result full recovery. An analysis was also made of assessing the quality of life of patients after surgery in the long-term period, after 6 and 12 months.

We have chosen a cytomorphological method to assess the course of the phases of the wound process as one of the main criteria. Many different

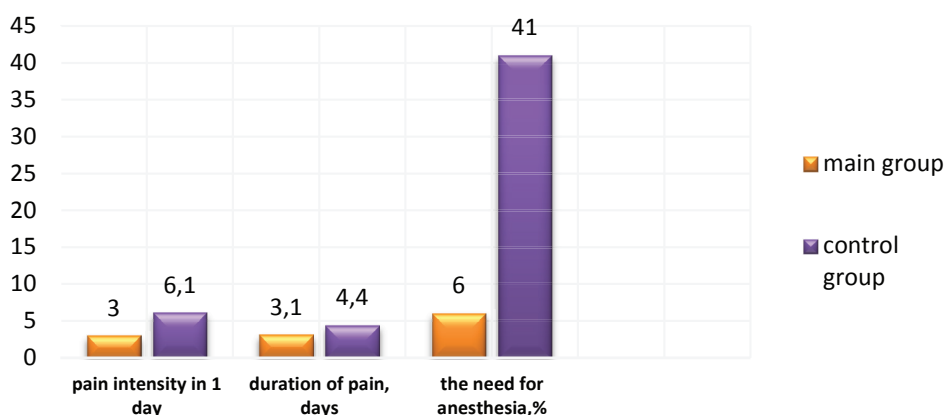
methods are used in the clinic: the method of smears of prints from wounds, the determination of the pH of the wound discharge, the amount of protein in it, and the qualitative and quantitative bacteriological control [19]. The most commonly used cytological method for the study of wounds is the method of "superficial biopsy of wounds". The method is based on taking material from the surface layer of the wound with a flat instrument, which is then transferred to a glass slide, fixed, and stained [20].

We conducted a cytological study of smears from the contents of postoperative wounds on the 5th, 10th, and 21st days after surgery. Imprint smears were taken among all patients of the main group (n = 50) and the comparison group (n = 50) on 156 glass preparations. Wound discharge was taken with a thin spatula, and transferred to glass slides, followed by thin smears. The prepared smears were dried, fixed, and stained. On smears, together with a cytomorphologist, epitheliocytes of various stages of differentiation were determined including dystrophically altered ones with neutrophil invasion and contaminated with microorganisms. In addition, mononuclear cells with cytoplasm, naked mononuclear cells, segmented neutrophils and lymphocytes, erythrocytes, fibroblasts, collagen fibers, as well as rod and coccal microflora were detected.

#### Results

The intensity of pain, assessed by patients on the VAS scale, was maximum on the first day after surgery and was estimated at an average of  $3 \pm 0.2$  points in the main group and  $6.1 \pm 0.3$  points in the comparison control group. At the same time, a day after the intervention in all 2 groups there was a significant decrease in the severity of pain - by  $0.9 \pm 0.2$  and  $1 \pm 0.2$  points, respectively ( $P < 0.001$ ). The duration of pain after surgery averaged  $3.1 \pm 0.2$  days in the main group and  $4.4 \pm 0.2$  days in the control group (Figure 1).

Figure 1. The severity and duration of the pain syndrome



Complications of the early postoperative period. The development of early postoperative complications in the main group - in 6 (12%). In the control group, complications were diagnosed in 14

(28%) cases. The methods of operations we use for chronic hemorrhoids have certain advantages, the number of complications does not increase, but decreases (Figure 2).



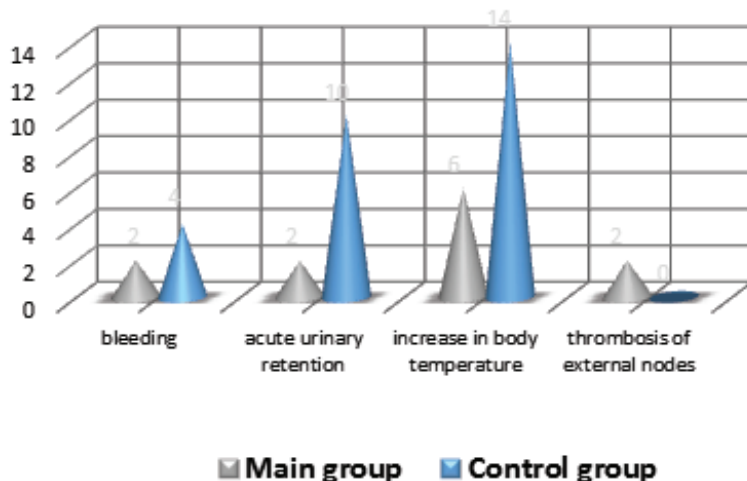


Figure 2. Complications of the early postoperative period

The dynamics of the wound process were assessed by the cytological picture in smears-prints from the wound surface, paying attention to such criteria as the severity of the neutrophilic reaction, the timing of appearance, the number and maturity of epitheliocytes, fibroblasts, and collagen fibers. The cytological examination was performed on the 5th, 10th, and 21st days after the operation. In the control group, the neutrophil reaction was more pronounced and persisted in some patients until the 15th day after surgery (Figure 3). In the main group, elements of epithelialization appeared faster (from the 10th day - in 35%), fibroblasts, epitheliocytes, and

bundles of collagen fibers were detected earlier and in greater numbers (Figure 4) and on the 21st day, they were already present in more than 70% sick. At the same time, cytological signs of epithelialization in the control group were observed in less than half of the cases. Complete epithelialization of wounds was determined visually when observing patients after discharge from the hospital. Wound healing was recorded in the range of 15 to 36 days after surgery. The average terms of epithelialization were longer in the control group and amounted to  $31.1 \pm 2.2$  days compared to  $20.3 \pm 3.9$  days in the main group. Differences in the groups were significant ( $p < 0.05$ ).

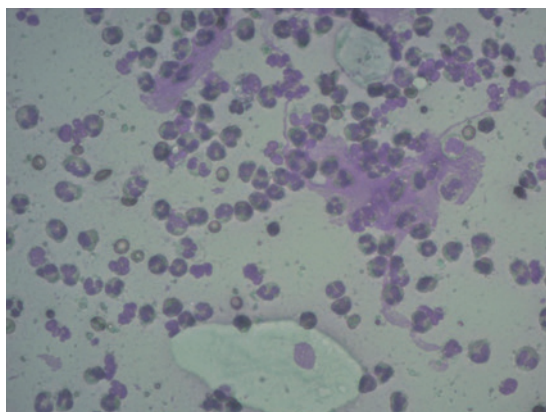


Figure 2. Cytomorphological picture, control group, 5 days. Pronounced neutrophilic reaction

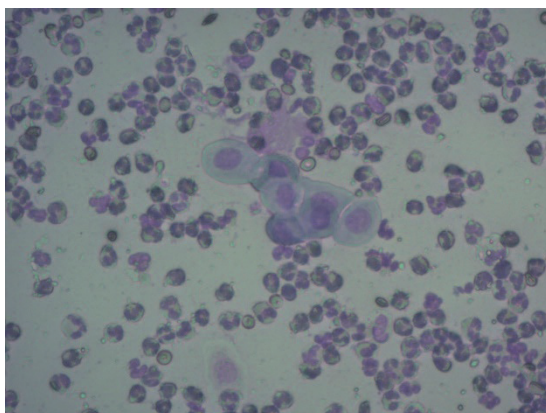


Figure 3. Cytomorphological picture, main group, 5 days. There are elements of epithelialization, fibroblasts, and epitheliocytes

*Terms of rehabilitation, medical rehabilitation.* One of the important criteria for the effectiveness of a surgical intervention is the study of the terms of rehabilitation and medical rehabilitation. After hemorrhoidectomy with PRP therapy, by day 15, 31 (62%) patients, and by day 25, 50 (100.0%) patients returned to work. With hemorrhoidectomy according to Milligan-Morgan, constituting the control group, by day 30, 32 (64%) patients and by day 40, all patients began to work. Thus, in patients who underwent hemorrhoidectomy with PRP therapy for the hemorrhoidal disease of stages 2-3, the period of disability is significantly reduced. This is due to the accelerated onset of complete epithelialization of the wound, which contributes to the prevention of complications, helps to reduce pain and reduces rehabilitation time, and reduces scarring and a small number of complications in the postoperative period.

*The results of the treatment of chronic hemorrhoids 3 months after the intervention. A*

comparative analysis carried out 3 months after the intervention to reduce the frequency of complaints of patients showed that when using the surgical technique using PRP therapy, complaints of rectal bleeding disappear faster than after other methods of treatment. The largest proportion of patients who persisted with any complaints occurred after open hemorrhoidectomy with the traditional method of management. Thus, the assessment of objective and subjective symptoms shows that 3 months after the intervention of the compared methods with the use of PRP therapy, it shows the best results. In total, the development of 2 types of long-term complications of treatment was recorded - the formation of anal fissures and the development of strictures of the anal canal. The formation of anal fissures took place only after the application of the traditional technique (frequency - 3%). The development of anal canal strictures was recorded in 1 patient of the main group and in 2 patients of the main group.

Table 1.  
Results of the study

Group	Main	Control group
Pain intensity in 1 day (VAS scores)	3±0,2	6,1±0,3 *
Pain duration (days)	3,1±0,2	4,4±0,2 *
The need for pain relief with narcotic analgesics	6%	41% *
Complications of the early postoperative period in patients	6/12%	14/28%
Recovery time as a percentage	15 day	62%
	25 day	100%
	30 day	100%
	40 day	100%
Reduction of complaints after 3 months (bleeding)	88% reduction	67% reduction
Stricture formation	2%	4%
Anal fissure formation	0%	3%

*Assessment of the quality of life of patients 6 months after surgery.* We surveyed patients to assess their quality of life after hemorrhoidectomy. Through Google form, the questionnaire developed by us was sent to 100 patients after surgery after 6 months. According to the results of the questionnaire, there was no statistical difference between the groups in terms of changes in the quality of life 6 months after the operation. 80% of respondents have a high level of quality of life and do not require additional medical interventions, they are recommended to maintain a proper lifestyle. 16% have a good quality of life index, and there are periodic uncomfortable sensations, as there is a tendency to constipation. This group of patients is recommended to carry out prophylactic treatment once a year and stool regulation. 4% of patients have complaints of a decrease in the quality of life. One 72-year-old patient complained of periodic leakage of mucus, and had problems with weakness of the sphincter muscles before the operation, a course of a complex of therapeutic exercises for the muscles of the pelvic floor is being carried out. Three patients noted intermittent

itching in the anus, pain during defecation, and bleeding. Examination revealed anal fissures and varicose veins in the anal canal and rectum. Also, according to the analysis of the bacteriological culture of feces, signs of dysbacteriosis were revealed. A complex of conservative therapy and stool regulation was prescribed.

#### Conclusion

Given the results of the study, we recommend the use of an integrated approach using PRP therapy in the treatment of chronic hemorrhoids. The developed complex method using PRP therapy and postoperative drug treatment and management of patients allows for the successful treatment of stage 2-3 chronic hemorrhoids. One of the ways to optimize the process of accelerated regeneration is PRP therapy. The use of PRP therapy accelerates the onset of complete epithelialization of the wound, contributes to the prevention of complications, helps to reduce pain and reduces rehabilitation time, and reduces scarring. The introduction of optimized methods of treatment and management of patients with chronic hemorrhoids into the practice of medical institutions will improve the

results of treatment of patients by reducing the frequency of postoperative complications and relapses of the disease, reducing the duration of

treatment and temporary disability, and achieving a high economic effect.

## References

- Gemorroi. Klinicheskie protokoly Ministerstva zdravookhraneniya Respubliki Kazakhstan – 2018 [Haemorrhoids. Clinical protocols of the Ministry of Health of the Republic of Kazakhstan - 2021]. MedElement. <https://diseases.medelement.com/disease/gemorroi-2018/16135> (Accessed 23 February 2021) [in Russian]
- Sandler RS, Peery AF. Rethinking What We Know About Hemorrhoids. *Clin Gastroenterol Hepatol.* 2019 Jan;17(1):8-15. doi: 10.1016/j.cgh.2018.03.020. Epub 2018 Mar 27. PMID: 29601902; PMCID: PMC7075634.
- LeClere FB, Moss AJ, Everhart JE, Roth HP. Prevalence of major digestive disorders and bowel symptoms, 1989. *Adv Data.* 1992 Mar 24;(212):1-15. PMID: 10119851.
- Shelygin Yu.A., Frolov S.A., Titov A.Yu., i dr. Klinicheskie rekomendatsii assotsiatsii koloproktologov Rossii po diagnostike i lecheniyu gemorroya [The Russian association of coloproctology clinical guidelines for the diagnosis and treatment of hemorrhoids]. *Koloproktologiya.* 2019. 18(1(67)):7 -38. <https://doi.org/10.33878/2073-7556-2019-18-1-7-38> [in Russian]
- Davis B.R., Lee-Kong S.A., Migaly J., Feingold D.L., Steele S.R. The American Society of Colon and Rectal Surgeons Clinical Practice Guidelines for the Management of Hemorrhoids // *Dis. Colon Rectum*, vol. 61, no. 3, pp. 284–292, Mar. 2018, doi: 10.1097/DCR.0000000000001030.
- Feroci F. et al. Fast-track colorectal surgery: Protocol adherence influences postoperative outcomes // *Int. J. Colorectal Dis.*, vol. 28, no. 1, pp. 103–109, Jan. 2013, doi: 10.1007/s00384-012-1569-5.
- Gallo G. et al. Consensus statement of the Italian society of colorectal surgery (SICCR): management and treatment of hemorrhoidal disease // *Techniques in Coloproctology*, vol. 24, no. 2. Springer, pp. 145–164, Feb. 01, 2020, doi: 10.1007/s10151-020-02149-1.
- Wesarachawit W, Pattana-arun J. Antibiotics and early post operative complications of closed hemorrhoidectomy: a retrospective matched pair study. *J Med Assoc Thai.* 2007 Sep;90(9):1828-32. PMID: 17957926.
- Moreira H Jr, Moreira JP, Isaac RR, Alves-Neto O, Moreira TA, Vieira TH, Brasil AM. Morphine spinal block anesthesia in patients who undergo an open hemorrhoidectomy: a prospective analysis of pain control and postoperative complications. *Ann Coloproctol.* 2014 Jun;30(3):135-40. doi: 10.3393/ac.2014.30.3.135. Epub 2014 Jun 23. PMID: 24999465; PMCID: PMC4079812.
- Saluja H. Platelet-Rich fibrin: A second generation platelet concentrate and a new friend of oral and maxillofacial surgeons // *Annals of Maxillofacial Surgery*–2011. – V.1. – P.53–57.
- Simonpieri A. The relevance of Choukroun's platelet-rich fibrin and metronidazole during complex maxillary rehabilitations using bone allograft. Part I: A new grafting protocol // *Implant Dentistry* – 2009. – V.18. – P.102–111.
- Gassling V.L. Platelet-rich plasma and platelet-rich fibrin in human cell culture // *Oral Surgery, Oral Medicine, Oral Pathology, and Oral Radiology* – 2009. – N 108. – P.48–55.
- Villela D.L. Evidence on the use of platelet-rich plasma for diabetic ulcer: a systematic review// *Growth factors.* – 2010. – V.28, N 2. – P.1.
- Villela D.L. Topical therapy of chronic leg ulcers with platelet-rich plasma: a systematic review of the literature // *Conference of the Wound Ostomy Continence Nurse Society, St Louis, Mo, June 2010.*
- Pietrzak W.S. Platelet rich plasma: biology and new technology // *Journal of Craniofacial Surgery.* – 2005. – V.16, N. 6. – P.1043–1054
- Laughlan K., Jayne D. G., Jackson D. Stapled haemorrhoidectomy compared to Milligan-Morgan and Ferguson haemorrhoidectomy: a systematic review // *Int. j. colorectal. dis.* – 2009. –Mar. 24. № 3. –P. 335–44.
- Nienhuijs S.W., deHingh I.H. Pain after conventional versus Ligasure haemorrhoidectomy. A meta-analysis // *International journal of surgery.* –2010. –Vol. 8. № 4. –P. 269–73.
- Panarese A., Pironi D., Vendettuoli M. Stapled and conventional Milligan-Morgan haemorrhoidectomy: different solutions for different targets // *International journal of colorectal diseases.* –2012. –Apr. Vol. 27. № 4. –P. 483–87.
- Froehner Junior I., Kotze P. G., Rocha J. G., Miranda E. F., Sartor M. C., Martins J. F., Abou-Rejaile V., Steckert Filho A., Correa M. F. Postoperative topical analgesia of hemorrhoidectomy with policlesulen and cinchocaine: a prospective and controlled study // *Rev. col. bras.cir.* –2014. – Mar.-Apr. Vol. 41. № 2. –P. 92–8.
- Lopez N., Cervero S., Jimenez M.J., Sanchez J.F. Cellular characterization of wound exudate as a predictor of wound healing phases // *Wounds.* – 2014. – №26. – P.101–107