UDC 616.147.17-007.64-089:615
DOI http://doi.org/10.30978/GS-2023-3-52

ISSN 2786-5584 print
ISSN 2786-5592 online

An initial experience with laser hemorrhoidoplasty in patients with grade 2-3 hemorrhoids

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Hemorrhoids are detected in 11 % of the adult population, and they account for 42 % of all rectal disorders. According to leading coloproctology centres, about 30 % of patients with chronic hemorrhoids require surgical intervention. Each of these methods has its own advantages and disadvantages. None of them, however, provides minimally invasive intervention, which is the prevailing trend in modern surgery.

Objective — to conduct a comparative analysis and evaluate the outcomes of laser hemorrhoidoplasty and Milligan-Morgan hemorrhoidectomy for patients with grade 2—3 chronic hemorrhoids.

Materials and methods. The study presents the treatment outcomes of 59 patients with grade 2—3 chronic internal hemorrhoids. The main group included 29 patients who underwent laser hemorrhoidoplasty. As a surgical treatment, the 30 patients in the control group underwent the Milligan-Morgan operation using an Ethicon Harmonic ultrasonic electrosurgical coagulator.

Results. Treatment of hemorrhoids with a diode laser performed by a trained surgeon in accordance with the protocol and manner of execution offers a number of advantages compared to the traditional Milligan-Morgan procedure. These advantages include a shorter operation time ($p < 0.001$), reduced intensity and duration of postoperative pain after laser hemorrhoidoplasty (an average of 3.59 ± 1.15 days), whereas after Milligan-Morgan surgery, it was 5.60 ± 1.22 days ($p < 0.001$), decreased incidence of postoperative bleeding, and maintaining the radicality of the removal of the cavernous tissue substrate.

Conclusions. In the surgical treatment of grade 2—3 chronic internal hemorrhoids, laser hemorrhoidoplasty of internal hemorrhoidal nodes has undeniable advantages over the standard Milligan-Morgan procedure.

Keywords
hemorrhoidal disease, laser hemorrhoidoplasty, Milligan-Morgan operation.

ARTICLE • Received 2023-10-31 • Received in revised form 2023-11-23

Hemorrhoidal disease is among the most urgent and unresolved medical and socioeconomic problems due to its high prevalence among the general population, particularly in industrialised countries. The disease also contributes to a significant morbidity rate among working-age individuals and can result in long-term incapacity for work during exacerbation periods [3, 6, 7]. Thus, hemorrhoids are detected in 11 % of the adult population, and they account for 42 % of all rectal disorders. According to leading coloproctology centres, about 30 % of patients with chronic hemorrhoids require surgical intervention [8, 12].

It is obvious that only surgical methods of treatment for this pathology give the patient a chance of recovery. The Milligan-Morgan operation, which involves the use of mechanical tissue dissection or electrosurgical techniques such as cutting,

coagulation, welding, or ultrasonic tissue dissection, is the most commonly performed procedure. Each of these methods has its own advantages and disadvantages [9, 10]. None of them, however, provides minimally invasive intervention, which is the prevailing trend in modern surgery. Laser technologies for treating haemorrhoidal disease are becoming increasingly popular among proctologists [4, 5, 12]. This is attributed to the discovery of new effects of laser radiation on tissues, which have become possible due to advancements in light-generating and supplying equipment as well as overall operational parameters. These improvements allow for a significant therapeutic effect through minimally invasive procedures. Nevertheless, laser hemorrhoidoplasty for internal hemorrhoids has its disadvantages, which can have a substantial impact on the outcomes of surgical treatment in this specific group of patients [6, 7, 10]. When internal hemorrhoidal plexuses are laser-vaporised, an uncontrollable tissue destruction process takes place. Moreover, external hemorrhoidal nodes and perianal skin folds may be present, potentially causing thrombosis, inflammatory processes, or aesthetic discomfort in the patient [1, 2, 7, 11]. Therefore, there is ongoing debate on the best surgical treatment strategy for internal hemorrhoids, depending on the disease stage and variations [9, 10].

Objective — to conduct a comparative analysis and evaluate the outcomes of laser hemorrhoidoplasty and Milligan-Morgan hemorrhoidectomy for patients with grade 2—3 chronic haemorrhoids.

Materials and methods

The study presents the treatment outcomes of 59 patients with grade 2—3 chronic internal hemorrhoids who were admitted to the surgical clinic of Communal Non-Commercial Enterprise «Kyiv City Clinical Hospital No. 3», which is the base of the Department of General Surgery No. 2 at Bogomolets National Medical University. All patients received their surgical care in a hospital setting. Before surgery, they underwent a standard comprehensive examination, which included general clinical laboratory tests, an ECG, a lung X-ray, a gastroscopy, and a colonoscopy.

During surgery, all patients underwent intravenous anaesthesia with propofol and local infiltration anaesthesia with a 0.4 % lidocaine solution.

The main group included 29 patients who underwent laser hemorrhoidoplasty. The patients ranged in age from 28 to 73 years, with an average age of 44.07 ± 11.22 years. Of these, men made up 37.9 % (11 patients), while women made up 62.1 % (18 patients). The duration of the disease ranged from 6 months to 25 years, with an average of 6.7 years. The patients were divided based on the disease stage as follows: Grade 2 was diagnosed in 20 patients (68.9 %), and Grade 3 was observed in 9 (31.1 %). The patients exhibited the following symptoms of hemorrhoidal disease: recurrent anal bleeding in 20 patients (68.9 %); prolapse of hemorrhoidal nodes in 21 (72.4 %); pronounced pain syndrome in the anal canal in 6 cases (20.6 %); discomfort and itching in 5 patients (17.2 %); and aesthetic discomfort in 4 patients (13.7 %). 22 patients, or 75.8 % of the total, had a combination of two or more variables.

The 1470 nm diode laser *LIKA-surgeon+* manufactured by *Fotonik Plus*, was used in the study. Following the anal divulsion, the initial stage of the surgical operation included a visual assessment of the size and structure of the internal hemorrhoidal nodes using a mirror. In the second stage, a standard tumescent solution was injected under the internal nodule and into the submucosal base around the nodule. In the third stage, the mucosa above the node was fixed using a clamp. Through a puncture in the mucosa above the dentate line, the sharp Biolitec light guide, operating in «pilot» mode, was visually directed to the proximal parts of the pedicle of the hemorrhoidal node, located between the submucosal layer and the internal sphincter. Subsequently, thermal ablation was conducted within the hemorrhoidal tissue using the «active» pulse mode of 50/50 ms, with the light guide gradually being moved outward. A single node could receive a maximum light dose of 200 J. The prescribed dose was evenly administered over the entire node, irrespective of its structure (whether solitary or branched). Finger compression was applied to the laser exposure zone for a maximum duration of 2 minutes following the removal of the laser fiber. A loose anal tamponade dressing consisting of a cooled gauze pad coated with ointment was inserted after the surgical procedure. In the postoperative period, patients received standard anti-inflammatory therapy and painkillers as required.

In order to compare the outcomes of laser hemorrhoidectomy in patients with grade 2—3 hemorrhoids, 30 patients were included in a control group with similar pathology. The patients ranged in age from 29 to 72 years, with an average age of 47.80 ± 12.72 years. Of these, men made up 43.3 % (13 patients), while women made up 56.6 % (17 patients). The duration of the disease ranged from 8 months to 27 years, with an average of 7.1 years. The patients were divided based on the disease stage as follows: Grade 2 was diagnosed in 22 patients (73.3 %), and Grade 3 was observed in 8 (26.7 %).

The patients exhibited the following symptoms of hemorrhoidal disease: recurrent anal bleeding in 23 patients (76.6 %); prolapse of hemorrhoidal nodes in 20 patients (66.6 %); pronounced pain syndrome in the anal canal in 5 cases (16.6 %); discomfort and itching in 8 patients (26.6 %); and aesthetic discomfort in 3 patients (10.0 %). A combination of two or more variables was noted in 23 patients (76.6 %). As a surgical treatment, the patients underwent the Milligan-Morgan operation using an Ethicon Harmonic ultrasonic electrosurgical coagulator.

The selected groups of patients were statistically comparable in terms of age, sex, duration of the disease, and clinical manifestations of the pathology. Statistical analysis of the research results was carried out in the statistical package IBM SPSS Statistics Base (version 22). All results were considered statistically significant at a value of $p < 0.05$. Quantitative data are presented as the arithmetic mean ± standard deviation (SD) unless otherwise stated. The normality of the data distribution was checked using the chi-square test. Data were considered to follow a normal distribution if the result of this test was $P > 0.05$. For data whose distribution does not differ from normal, the comparison was made using the Student's t-test for unrelated samples. For non-normally distributed data, comparisons were made using the Wilcoxon-Mann-Whitney test for unrelated samples.

Results and discussion

When comparing the treatment results between groups of patients, we focused on key criteria such as the technical complexity and operation time, the intensity and duration of postoperative pain, the length of hospital stay, the presence of complications, and the immediate and long-term outcomes of each of the treatment methods. In terms of operation time, laser hemorrhoidoplasty took an average of 21.55 ± 2.97 minutes, while the Milligan-Morgan procedure took 43.87 ± 4.97 minutes, which is a statistically significant difference. In our opinion, laser vaporisation of hemorrhoidal tissue is a technically simpler procedure and does not present any difficulties if the technique is mastered and adhered to. The patients did not experience any complications during laser hemorrhoidoplasty or in the early postoperative period. In 3 cases, there were minor local parabiotic changes to the mucous membrane in the manipulation projection, which did not require therapeutic strategy adjustment and subsequently did not result in the onset of mucosal necrosis. Among the patients who underwent Milligan-Morgan surgery, one individual experienced bleeding from the surgical wound during the early postoperative phase. This bleeding was successfully stopped with the use of an extended tamponade. Another crucial criterion for comparison is the intensity of the pain syndrome in the postoperative period. For a comparative assessment, the severity of pain was measured using the VAS score on the 1st, 3rd, and 5th postoperative days. According to the findings, the intensity of the pain syndrome after laser hemorrhoidoplasty was lower in all cases compared to the Milligan-Morgan procedure, with statistical significance of the difference. It should be noted that 18 patients (62 %) in the main group and all patients in the control group required non-narcotic analgesics within the initial 24 hours after laser vaporisation. 4 patients (13 %) in the control group required narcotic analgesics. On the 5th day, none of the patients in the main group required painkillers. In contrast, 5 patients (17 %) in the control group took non-narcotic analgesics for pain relief. The aforementioned tendency was also observed in the findings of the analysis comparing the duration of pain in the studied groups of patients. Thus, after laser hemorrhoidoplasty, patients reported an average of 3.59 ± 1.15 days of pain, whereas after Milligan-Morgan surgery, it was 5.60 ± 1.22 days, which is a statistically significant difference. As a result, in terms of severity and duration of postoperative pain, laser hemorrhoidoplasty outperforms the standard Milligan-Morgan procedure in the treatment of grade 2—3 hemorrhoids. The statistical indicators used to compare different groups of patients are shown in the Table.

In terms of hospital stay, all patients in the main group did not require inpatient therapy the day after surgery. In this aspect, we disagree with some authors' statement that laser hemorrhoidoplasty is a completely outpatient operation. After the Milligan-Morgan procedure, patients required inpatient care for 3—5 days.

Despite all of the benefits of laser hemorrhoidoplasty, it should be noted that during the long-term follow-up period (6 months after surgery), 4 patients (14 %) had a perianal skin fold in the manipulation projection, which could be a potential source of aesthetic discomfort in the future. We associate this with the large size of the hemorrhoidal node before surgery.

Thus, laser hemorrhoidoplasty, a minimally invasive procedure, effectively reduces hemorrhoidal tissue without causing damage to the serous membrane or the internal anal sphincter while maintaining the anatomical integrity of the anal canal.

In conclusion, it is important to note that all methods of hemorrhoid treatment have their advantages, disadvantages, and limitations. However,

Table. **Comparative analysis of surgical outcomes in patients with stage 2—3 haemorrhoids treated with laser hemorrhoidoplasty and Milligan-Morgan surgery (M ± SD)**

Index	Main group (n = 29)	Control group (n = 30)	p
Operation time, min	21.55 ± 2.97	43.87 ± 4.97	< 0.001*
Intensity of pain syndrome (VAS score)			
Within 24 hours after surgery	2.90 ± 0.72	7.13 ± 1.25	< 0.001**
On the 3rd day after surgery	3.93 ± 0.84	5.07 ± 1.05	< 0.001**
On the 5th day after surgery	2.66 ± 0.81	4.93 ± 0.87	< 0.001**
Duration of postoperative pain, days	3.59 ± 1.15	5.60 ± 1.22	< 0.001**

Note. * Student's criterion; **Wilcoxon test.

treatment of hemorrhoids with a diode laser performed by a trained surgeon in accordance with the protocol and manner of execution offers a number of advantages compared to the traditional Milligan-Morgan procedure. These advantages include a shorter operation time, reduced intensity and duration of postoperative pain, decreased incidence of postoperative bleeding, and maintaining the radicality of the removal of the cavernous tissue substrate.

Conclusions

Despite advancements in modern medical technology and pharmacy, hemorrhoidal disease remains an urgent problem in medicine.

In the surgical treatment of grade 2—3 chronic internal haemorrhoids, laser hemorrhoidoplasty of internal hemorrhoidal nodes has undeniable advantages over the standard Milligan-Morgan procedure.

Declaration of interests

The authors declare that they have no conflicts of interest.

Funding. No grants or funding were used in this study.

Authors contributions

Concept and design of the study: T. M. Galyga, V. M. Perepadja, Y. V. Vladichuk; material collection, material processing, statistical data processing, and writing the manuscript: T. M. Galyga, V. M. Perepadja, Y. V. Vladichuk, V. R. Antoniv, M. S. Kryvopustov, S. L. Kindzer.

All authors have read and approved the final manuscript.

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Перший досвід лікування хворих на геморой 2—3-ї стадії із застосуванням лазерної гемороїдопластики

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Геморой виявляють у 11 % дорослого населення. На його частку серед захворювань прямої кишки припадає 42 %. За даними провідних колопроктологічних центрів, хірургічному лікуванню підлягають близько 30 % пацієнтів із хронічним гемороєм. Є багато методик лікування геморою, які мають як переваги, так і недоліки. Однак жодна з них не забезпечує малоінвазивності операції, що є провідною тенденцією в сучасній хірургії.

Мета — провести порівняльний аналіз та оцінити результати хірургічного лікування пацієнтів із хронічним гемороєм 2—3-ї стадії із застосуванням лазерної гемороїдопластики та гемороїдектомії за Мілліган-Морганом.

Матеріали та методи. Проаналізовано результати лікування 59 пацієнтів із хронічним внутрішнім гемороєм 2—3-ї стадії. До основної групи залучено 29 пацієнтів, яким проводили лазерну гемороїдопластику. У контрольній групі 30 пацієнтам виконано операцію за Мілліганом-Морганом із застосуванням ультразвукового електрохірургічного коагулятора Ethicon Harmonic.

Результати. Лікування геморою діодним лазером, яке проводиться кваліфікованим хірургом із дотриманням методики виконання, має низку переваг перед класичною операцією за Мілліганом-Морганом: коротший менша тривалість операції ($p < 0{,}001$), менша інтенсивність і тривалість больового синдрому в післяопераційний період (після лазерної гемороїдопластики в середньому — ($3{,}59 \pm 1{,}15$) доби, після операції за Мілліганом-Морганом — ($5{,}60 \pm 1{,}22$) доби ($p < 0{,}001$)), менша частота післяопераційних кровотеч при збереженні радикальності усунення субстрату кавернозної тканини.

Висновки. Лазерна гемороїдопластика внутрішніх гемороїдальних вузлів у пацієнтів із хронічним внутрішнім гемороєм 2—3-ї стадії має переваги перед класичною операцією за Мілліганом-Морганом.

Ключові слова: гемороїдальна хвороба, лазерна гемороїдопластика, операція за Мілліганом-Морганом.

FOR CITATION

Galyga TM, Perepadja VM, Vladichuk YV, Antoniv VR, Kryvopustov MS, Kindzer SL. An initial experience with laser hemorrhoidoplasty in patients with grade 2-3 hemorrhoids. General Surgery (Ukraine). 2023;3-4;52-56. http://doi.org/10.30978/GS-2023-3-52.