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MODERN METHODS OF TREATMENT OF ANAL STENOSIS

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СОВРЕМЕННЫЕ МЕТОДЫ ЛЕЧЕНИЯ АНАЛЬНЫХ СТЕНОЗОВ

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Objective. To develop and put into practice a new combined method of anal stenosis surgical treatment based on laser plastic surgery of tissues with a diode laser. Assess the effectiveness of the technique based on the analysis of immediate and long-term results, postoperative complications, peculiarities of technical implementation, and features of the quality of patients` life.

Materials and methods. The study involved 68 patients with anal stricture after the anal and (or) rectal surgery. All patients underwent laser correction of postoperative scar tissue. According to indications, botulinum toxin was injected into the internal sphincter and (or) PRP autoplasma perarectally. Surgery was performed under intravenous anesthesia with the addition of tumescent anesthesia or local anesthesia. Laser radiation from a diode device with a wavelength of 1.56 microns and a power of 10 W was applied.

Results. There are no restrictions on laser correction of anal stenosis regardless of the type and complexity of anal stenosis, it is technically easy to use, minimizes the risk of postoperative complications and relapse of the disease, and has a highly effective treatment result.

Conclusions. The technique is characterized by versatility and ease of use, highly effective results, high quality of patients` life, and it can be used routinely on an outpatient basis.

Keywords. Anal stenosis, anal stricture, laser, botulinum toxin, PRP autoplasma.

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Цель. Разработать и внедрить в практику новую комбинированную методику хирургического лечения анального стеноза, основанную на лазерной пластике тканей диодным лазером. Провести оценку эффективности методики, основываясь на анализе ближайших и отдаленных результатов, наличии послеоперационных осложнений, особенностях технического выполнения и качества жизни пациентов.

Материалы и методы. В исследовании приняли участие 68 пациентов с анальной стриктурой после хирургического лечения анального канала и (или) прямой кишки. Всем пациентам выполнялась лазерная коррекция послеоперационной рубцовой ткани. По показаниям вводился ботулинический токсин во внутренний сфинктер и (или) PRP-аутоплазма параректально. Хирургическое лечение выполнялось под внутривенным обезболиванием с добавлением тумесцентной анестезии или под местной анестезией. Применялось лазерное излучение диодного аппарата с длиной волны 1,56 мкм, мощность – 10 Вт.

Результаты. Лазерная коррекция анального стеноза не имеет ограничений по виду и сложности анального стеноза, обладает технической простотой в применении, позволяет минимизировать риск послеоперационного осложнения и рецидива заболевания, обладает высокой эффективностью результата лечения.

Выводы. Методика характеризуется универсальностью и простотой применения, высокой эффективностью результата, высоким качеством жизни пациентов, может применяться рутинно в амбулаторных условиях.

Ключевые слова. Анальный стеноз, анальная стриктура, лазер, ботулинический токсин, PRP-аутоплазма.

INTRODUCTION

Anal stenosis continues to be a relevant problem in modern coloproctology. Acquired anal stenoses, also known as strictures, develop in 90 % of cases after surgery performed on the anal canal [1]. The incidence rate, according to various data, ranges from 1.5 to 9 % among all operated patients with benign diseases of the rectum and anal canal [2].

Predisposing factors for the development of anal stenosis are autoimmune diseases, pathology of the gastrointestinal tract, the presence of food or drug allergies, abdominal and pelvic adhesions, rapid acetylation, an increase in the number of positive reactions of the test system with an antigenic scar complex and blood sera of patients in dynamics. These factors result in increased formation of excessive dense scar tissue in patients after anal canal surgery [3].

The main cause of anal canal strictures is an excessive amount of surgical intervention. Another common cause is the development of purulent-septic complications in the postoperative period [4].

Treatment of anal stenosis depends on the severity of scarring. In mild cases of stenosis, conservative treatment is recommended. There are some methods of bougienage and divulsion with the use of cones of various diameters, pneumodilators, etc. [5]. Moderate to severe strictures require surgical treatment. Modern medicine describes many methods of surgical treatment of anal stenosis, most of them are plastic surgery.

The most common complication of surgical treatment is anal insufficiency (up to

39 %). Moreover, postoperative bleeding, necrosis, suppuration, long-term non-healing wounds (up to 18 %) may occur. The relapse rate of the disease reaches 25 % [6].

Anal plastic surgery techniques have several main variants and their modifications, e.g. Y-V anoplasty, diamond flap anoplasty, house advancement flap anoplasty, island flap anoplasty, anoplasty with internal sphincterotomy, etc. [7–10]. Postoperative complications are caused by the complexity of the healing process of the anal canal due to the high level of displacement of the tissues of anus with their defecation trauma and a constant high level of bacterial contamination of postoperative wounds. Apart from that, anal stenosis always implies a weakened vascular microcirculation with a decreased level of oxygenation in scar tissue.

To improve the effectiveness, all types of anoplasty and sphincterotomy are currently performed selectively for each patient according to individual indications and often in combination. However, even under these conditions, the complication rate is determined to be no less than 13 %, and the relapse rate is no less than 7 % [11–15].

The objective of the study was to develop and put into practice a new combined method of anal stenosis surgical treatment based on laser plastic surgery of tissues with a diode laser. Assess the effectiveness of the technique based on the analysis of immediate and long-term results, postoperative complications, peculiarities of technical implementation, and features of the quality of patients' life.

MATERIALS AND METHODS

The study included 68 patients with anal stricture who underwent surgery between 2018 and 2023. The exclusion criteria were severe somatic condition of patients, a recent stroke or acute myocardial infarction (less than 3 months before the study), decompensated diabetes mellitus, and renal or hepatic insufficiency. The patients were conditionally divided into three groups according to the degree of narrowing – mild, moderate, and severe. The degrees directly correlated with the level of scar changes, the amount of surgical treatment, and the difficulties of postoperative rehabilitation (Table 1).

Table 1

Distribution of patients by gender and degree of disease

Stage	Male, abs (%)	Female, abs (%)
Mild	14 (45.2)	21 (56.8)
Moderate	13 (41.9)	14 (37.8)
Severe	4 (12.9)	2 (5.4)
Total	31 (100)	37 (100)

All the studied patients underwent laser correction of the scar tissue of the anal canal and/or lower ampullary rectum. Large keloid scars were subjected to interstitial destruction, and the superficial scar tissue was punctually treated by external influence. The radiation power in all cases was 10 W, the impulse mode was 0.5/0.5 s. The duration of exposure during the proce-

dure is no more than 1 second at one point with interstitial exposure and about 0.5 seconds with superficial treatment of less dense tissues. The distance between adjacent impact points averaged approximately 2 mm. The treatment was carried out under visual control of a pilot light indicator, and the intensity of the impact was also visually evaluated by changing the color of the scar tissue from white to yellow-gray. The appearance of darker shades indicates the beginning of carbonation (ablation) of tissues, which creates conditions for the development of postoperative complications. In the presence of an anal fissure in the scar tissue, the treatment was similar. To assess the functional state of the obturator apparatus, the first 12 operated patients underwent anorectal manometry (sphincterometry) 3–4 months after the surgery. In the remaining 56 patients, the study was not performed due to positive data previously obtained in 12 patients and based on the absence of functional complaints among all operated patients. In order to prevent postoperative spasm and improve vascular tissue nutrition, 43 of these 56 patients were intraoperatively injected with botulinum toxin at a dose of 50 IU into the internal sphincter. In 7 patients, long-term healing of postoperative wounds was noted – more than 2 months. PRP autoplasma was administered perarectally for correction, and a positive result was recorded in all cases (Table 2).

The majority of surgical interventions (65 patients) were performed under intravenous anesthesia with the addition of tumescent anesthesia. In 3 cases, at the request of the patients, the interventions were performed under local infiltration anesthesia. All the patients were admitted to a day hospital after the operation. Follow-up examinations were performed at two weeks, one, three and twelve months after the surgery.

The results were assessed based on the severity and duration of postoperative pain syndrome, the period of wound regeneration, the presence of postoperative complications and relapse of the disease, as well as the patient's satisfaction with the performed treatment.

RESULTS AND DISCUSSION

The treatment outcomes were evaluated at one, three, and twelve months after the surgery. Results were tracked in all 68 patients (100 %) within these terms.

Pain syndrome was assessed according to the VAS scale. All the patients had a one-time intraoperative administration of ketorolac (30 mg). Additional anesthesia was not required in any case. The period of hospitalization for all the patients was up to 5 hours. In the postoperative period, NSAIDs of the class of selective COX inhibitors were prescribed (Table 3).

The pain syndrome was not pronounced in all the cases – it depended on the stool, so the patients usually did not need additional anesthesia outside of defecation. One week after the surgery, the vast majority did not take any painkillers. However,

Table 2

Combinations of laser treatment, botulinum toxin and PRP autoplasma injection

Degree of stenosis	Laser, abs. (%)	Botulinum toxin, abs. (%)	Autoplasma, abs. (%)
Mild	35 (51.5)	18 (26.4)	–
Moderate	27 (39.7)	22 (32.4)	4 (5.9)
Severe	6 (8.8)	3 (4.4)	3 (4.4)
Total	68 (100)	43 (63.2)	7 (10.3)

Table 3

VAS scale pain syndrome assesment

Parameter	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Pain syndrome (points)	3.1+/-0.5	2.6+/-0.4	2.4+/-0.3	2.2+/-0.4	2.1+/-0.5	1.8+/-0.3	1.6+/-0.2
Taking NSAIDs, abs. (%)	68 (100)	62 (91.2)	58 (85.3)	52 (76.5)	43 (63.2)	31 (45.6)	17 (25)

according to our observations, some slight discomfort after stool persisted in all the patients for at least 1.5 months after surgical treatment. In some cases, the sensation post-defecation discomfort persisted for up to 6 months without any signs of objective pathological changes in the anal canal. They were of a low intensity and did not require additional anesthesia.

Complications in the immediate postoperative period, such as suppuration, sphincter spasm, and acute urinary retention, were not observed. Bleeding was recorded in one case. It was detected one week after the surgical treatment and was expressed by the daily discharge of 20–30 ml of blood during defecation. Defecation was complicated due to transient weakness of the muscular apparatus, blood was discharged from defects in the anoderm, and it was eliminated by stitching the anoderm with two separate sutures under local anesthesia.

At the beginning of our work, we observed a mild degree transient anal insufficiency in the form of periodic poor gas retention and nocturnal scanty discharge of intestinal mucus for about a month after the surgery. Therefore, we performed sphincterometry (anorectal manometry) in the first 12 patients to assess the function of the obturator apparatus and determine further patient management tactics. Sphincterometry was performed 2–3 months after the surgery and depended on the healing time of postoperative wounds and the absence of pain. However, by the end of the second month after the surgery, subjective complaints of lack of tightness in the anus disappeared in all patients. The conducted studies revealed the absence of anal insufficiency manifestations (Table 4).

The healing time of postoperative wounds ranged from 6 to 20 weeks. They directly correlated with the severity of scarring (Table 5).

Table 4

Anorectal manometry

Male, $n = 4$		Female, $n = 8$	
Average resting pressure, mmHg	Maximum contraction pressure, mmHg	Average resting pressure, mmHg	Maximum contraction pressure, mmHg
44–53	124–178	44–53	124–178

Table 5

Absence of complete healing of postoperative wounds

Degree of stenosis	6 weeks, abs. (%)	12 weeks, abs. (%)	18 weeks, abs. (%)
Mild	29 (42.6)	–	–
Moderate	15 (22.1)	1 (1.5)	–
Severe	6 (8.8)	6 (8.8)	2 (4.4)
Total	68 (100)	43 (63.2)	7 (10.3)

Cases of absence of complete epithelialization of wounds for more than 12 weeks were classified as complications – long-term non-healing wounds.

All the patients were evaluated for retention function after one year on the Wexner scale. In all the cases, no disturbance was detected (0 points). In the postoperative period, all the patients were recommended doing Kegel exercises at least 2 times a day for a period of no less than 3 months for preventive purposes after the pain and discomfort subsided.

In the long-term postoperative period, along with the function of the locking device, we evaluated the presence of long-term non-healing wounds and relapses of the disease 3 and 12 months after the surgery. After 3 months, epithelialization was not achieved in 7 patients (10.3 %), periodic discomfort was observed in 18 people (26.5 %). After 12 months, there were no defects in healing and no cases of significant discomfort for the patient.

All the patients with long-term non-healing wounds were from the group of severe stenoses. In all of the cases, we performed repeated laser treatment of the wound defect with an end light guide under local anesthesia, combining it with perarectal autoplasma injection and local application of collagen dressings. In the period of up to 2 months after the performed manipulations, the wounds were epithelized in all of the cases.

The evaluation of the quality of life was carried out at 1 and 12 months after the treatment. In all of the cases, patients noted a significant improvement in the quality of life on the second day of the postoperative period and characterized the results as good (13.5 %) and excellent (76.5 %).

Laser correction of anal stenosis has little experience of application. However, the obtained results indicate its high efficiency

and safety. Treatment of scar tissue with laser radiation at a power of 10W in pulse mode allows punctual and detailed elimination of scarring changes under visual control, while in the healing process of wound surfaces, due to the optimal ratio of type I and III collagens, not rigid, but elastic fibrous tissue is formed, that is close in its properties to the normal mucosa of the anal canal. This allows the anal canal to regain its elastic properties in the postoperative period.

The combination of laser treatment with the introduction of botulinum toxin into the internal sphincter accelerates the healing processes by improving tissue oxygenation. In cases of massive scarring processes with long-term wound healing, the regeneration process is effectively stimulated by perarectal administration of PRP-autoplasma. Minimally invasive methods and the possibility of a combined individual approach create conditions for minimizing the risks of postoperative complications and ensure the patient's recovery without the risk of developing a relapse of the disease.

Conclusion

The developed method of surgical treatment of anal stenosis is highly effective – in all of the cases, a positive treatment result was achieved. It is safe to apply – from the recorded complications, there was a single weakly expressed bleeding and about 10 % of cases of long-term non-healing wounds. The discharge of blood did neither require any emergency measures nor pose any risks to the patient's life and health. Long-term non-healing wounds were epithelized in all of the cases by repeated laser treatment of wound surfaces with perarectal autoplasma administration and the application of collagen dressings in the form of local treatment. The pain syndrome had a low intensity and duration in the postoperative period. All the patients reported a significant improvement in their quality of life and rated the treatment results as excellent and good. The performing technique is simple, convenient and fast, has no restrictions on the degree and severity of stenosis, and can be performed on an outpatient basis, under local anesthesia in particular. Laser plastic surgery is a worthy replacement for surgical anoplasty in solving the complex problem of anal stenosis.

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Author contributions:

Cherepenin M.Yu., Lutkov I.V., Gorsky V.A. – concept and design of the study.

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Lutkov I.V., Cherepenin M.Yu., Gorsky V.A. – material processing.

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