## INFLUENCE OF SUBTHRESHOLD POWER OF THE DIODE LASER ON THE FUNCTION OF THE RECTAL OBLITER DURING LASER OBLITERATION OF RECTINAL FISTULAS BY FILAC TECHNOLOGY Shekhovtsov S.A.<sup>1</sup> (Maldives Republic), Usmonova N.U.<sup>2</sup> (Republic of Uzbekistan)

<sup>1</sup>Shekhovtsov Stanislav Alexandrovich – surgeon, LEADING MULTIDISCIPLINARY CLINIC, ADDU, REPUBLIC OF MALDIVES <sup>2</sup>Usmonova Niginabonu Usmonovna - student, DEPARTMENT OF FACULTY AND HOSPITAL SURGERY, UROLOGY, BUKHARA STATE MEDICAL INSTITUTE NAMED AFTER ABU ALI IBN SINO, BUKHARA, REPUBLIC OF UZBEKISTAN

**Abstract:** the article presents the results of studying the functional state of the obturator apparatus of the rectum of patients who underwent both the standard FiLAC procedure and the modified procedure, using 14 W of power and extended exposure. The potential safety of the developed modification of the FiLAC technique is shown. **Keywords:** short rectal fistulas, complex rectal fistulas, laser obliteration of rectal fistulas, FiLAC technique, sphincterometry, Sphinctometer S 4402.

## ВЛИЯНИЕ ПОДПОРОГОВОЙ МОЩНОСТИ ДИОДНОГО ЛАЗЕРА НА ФУНКЦИЮ РЕКТАЛЬНОГО ОБЛИТЕРА ПРИ ЛАЗЕРНОЙ ОБЛИТЕРАЦИИ РЕКТИНАЛЬНЫХ СВИЩЕВ ПО ТЕХНОЛОГИИ FILAC Шеховцов С.А.<sup>1</sup> (Мальдивская Республика), Усмонова Н.У.<sup>2</sup> (Республика Узбекистан)

<sup>1</sup>Шеховцов Станислав Александрович - хирург. Ведущая многопрофильная клиника, г. Адду, Мальдивская Республика <sup>2</sup>Усмонова Нигинабону Усмоновна – студент, Кафедра факультетской и госпитальной хирургии, урологии, Бухарский государственный медицинский институт имени Абу Али ибн Сино, г. Бухара, Республика Узбекистан

Аннотация: в статье представлены результаты изучения функционального состояния запирательного аппарата прямой кишки у пациентов, которым выполнялась как стандартная процедура FiLAC, так и модифицированная процедура с использованием мощности 14 Вт и пролонгированного воздействия. Показана потенциальная безопасность разработанной модификации методики FiLAC. Ключевые слова: короткие свищи прямой кишки, сложные свищи прямой кишки, лазерная облитерация свищей прямой кишки, методика FiLAC, сфинктерометрия, сфинктометр S 4402.

**Introduction.** Treatment of patients with rectal fistulas has a long history. The first mention of a method for treating rectal fistulas belongs to Hippocrates. For a long time, various fistula excision techniques have been the gold standard in the treatment of this pathology. Undoubtedly, giving a positive effect in the form of a cure, they all carry the risk of occurrence or aggravation of manifestations of anal sphincter insufficiency as a result of its traumatization. In this connection, over the past two decades, sphincter-saving techniques have been developed and introduced into widespread proctological practice. This includes the use of various plugs (Plug technology) and the VAAFT or LIFT procedures and many others [1, 3, 7, 12, 16, 17, 19, 21]. One of these techniques is the technique of laser obliteration of rectal fistulas (FiLAC). This technique has been known for over 10 years. The technique is based on the use of a diode laser with a wavelength of 1470 nm and a power of 12-13 W. The result, in the form of obliteration of the lumen, is achieved by the action of laser radiation on the walls of the fistula through the waveguide introduced into the lumen of the fistula with its smooth extraction at a speed of 1 mm/1 sec. As a rule, the technology is effective in 70-75% of cases and has established itself as a sphincter-saving method for the treatment of rectal fistulas [13, 20]. However, the experience of using the technology has shown it to be less effective for short and complex rectal fistulas (Giamundo P., 2015). In order to increase the effectiveness of the technique, we have developed and proposed a modified method

of using the FiLAC technology, which consists in the use of more powerful radiation (14 W) and prolonged exposure of laser radiation to the walls of the fistula tract (removal of the light guide at a speed of 1 mm/3 sec.).

**Objective of the study:** To improve the quality of treatment of patients with short and complex rectal fistulas. Rationale for the use of high-power laser radiation that is safe for the function of anal retention against the background of prolonged exposure to the walls of the fistulous tract.

**Materials and research methods.** This study was performed on 62 patients with transsphincteric and extrasphincteric fistulas of the rectum using the Cherylas-15N device (manufacturer Wuhan Dimed Laser Technology Co., Ltd., China) and Lightguide SA600 light guide with radial energy radiation from the same manufacturer. The data on these patients were divided into two equal groups. The first group is the main group (OG). In it, laser obliteration of the fistula was performed using a diode laser with a wavelength of 1470 nm. and a power of 14 watts. The speed of extraction of the fiber in this case was 1 mm/3 seconds. The second group is the comparison group (GS). In it, laser obliteration of the fistula was performed according to the classical technique using a diode laser with a power of 12 W and a wavelength of 1470 nm. The speed of extraction of the fiber in this case was 1 mm/1 second. In both groups, the length of the fistula did not exceed 4 centimeters.

Patients included in the study were selected on the following principles:

- patients with transsphincteric fistulas;
- patients with extrasphincteric fistulas of 1-2 degrees of complexity;
- the presence of a fistulous passage not exceeding 4 centimeters in length;
- patients with primary and recurrent fistulas;
- the absence of additional fistulous passages and streaks;
- the absence of gross cicatricial deformity of the mucosa in the area of the internal opening of the fistulous tract;
- the width of the internal opening of the fistulous passage is not more than 5 mm;

As a result, both groups included 31 patients who fully met the above criteria. In order to assess the functional state of the obturator apparatus of the rectum, all patients underwent sphincterometry. The first time the study was performed in the preoperative period. The second time - on the 60th day after the procedure. The study was performed using the apparatus Sphinctometer S 4402 on the software Sphintro Dat (table 1). The study is well tolerated by most patients, does not require prior preparation and consists in measuring the pressure in the anal canal at rest and twice, during a volitional contraction of the anal sphincter.

| Floor | Age (years) | Resting pressure (mmHg) |           | Volitional contraction pressure (mm<br>Hg) |            |  |
|-------|-------------|-------------------------|-----------|--|------------|--|
|       |             | Average                 | Maximum   | Average                                    | Maximum    |  |
| Men   | 56.2±10.2   | 52.1±19.8               | 60.3±21.9 | 118.2±41.5                                 | 174.2±56.8 |  |
| Women | 54.9±13.7   | 37.1±15.3               | 43.8±15.5 | 75.1±29.5                                  | 99.1±39.7  |  |

Table 1. Normal values when using the sphincterometer S4402 (MSM, Germany).

According to the results of the study in patients from the OS group, the mean resting pressure in men was 42.7 mm Hg, while the standard values for the Sphinctometer S 4402 device were 52.1+/-19.8 mm Hg. In female patients, it was 29.4 mm Hg. with standard indicators of 37.1+/-15.3 mm.r.st. In the HS, men had mean blood pressure values of 39.4 mm Hg. The indicators for women were 31.4 mm Hg. (table 2).

The average values of the maximum volitional contraction in men from the OG group before the operation were 136.9 mm Hg. at the normative 174.2+/-56.8 mm.r.st.. Women from this group had indicators equal to 73.7 mm. at standard values equal to 99.1+/-39.7 mm.r.st. In the HS, these figures were 132.1 mm.r.st. in men and 70.7 mm. in women, respectively (table 2).

On the 60th day after the operation, the mean resting pressure in men from the OH group was 36.3 mm Hg. In women, they were within 26.8 mm Hg. respectively. In the GS group, men had an average blood pressure of 33.5 mmHg. Women, respectively, had a pressure equal to 28.9 mm Hg. (Table 3).

On the 60th day after the operation, the average values of the maximum pressure of volitional contraction in men from the OG group were 124.1 mm Hg. Women from this group had indicators equal to 65.7 mm Hg. Men from the HC group, at the same time, had indicators equal to 120.4 mm Hg. In women, this figure was 62.1 mm.r.St. (table 3).

Analysis of the obtained results shows that the majority of patients of both sexes initially had normal, albeit close to the lower limit of the norm, sphincterometry parameters. In the postoperative period, we see a further decrease in these indicators, in general, not going beyond the normal range in both groups in patients of both sexes. Despite the small number of patients included in the study, in general, we see that the use of laser technologies causes a decrease in the level of various pressure indicators in the anal canal. At the same time, the evaluation of the results of

sphincterometry after applying both variants of the technique showed no significant difference in the results obtained. This suggests that the use of laser radiation with a power of 14 W against the background of a longer exposure to the laser on the walls of the fistula tract (the speed of the fiber extraction is 1 mm  $\setminus$  3 sec) does not significantly affect the function of anal retention compared to the use of standard 12-13 W.

| Group | Mean resting pressure (mmHg) |       | Max. contraction pressure (mmHg) |       |  |
|-------|------------------------------|-------|----------------------------------|-------|--|
|       | Men                          | Women | Men                              | Women |  |
| OG    | 42.7                         | 29.4  | 136.9                            | 73.7  |  |
| HS    | 39.4                         | 31.4  | 132.1                            | 70.7  |  |

Table 2. Average numbers of pressure in the anal canal before surgery based on the results of sphincterometry.

| Table 3  | Average numbers | s of pressure in th | e anal canal d | after surger | v accordino | to the results | of sphincterometry  |
|----------|-----------------|---------------------|----------------|--------------|-------------|----------------|---------------------|
| Tuble 5. | Average numbers | s of pressure in in | е иниі синиї с | gier surger  | y accoraing | to the results | oj sprincierometry. |

| Group | Mean resting pressure (mmHg) |       | Max. contraction pressure (mmHg) |       |  |
|-------|------------------------------|-------|----------------------------------|-------|--|
|       | Men                          | Women | Men                              | Women |  |
| OG    | 36.3                         | 26.8  | 124.1                            | 65.7  |  |
| HS    | 33.5                         | 28.9  | 120.4                            | 62.1  |  |

**Conclusions.** The use of subthreshold powers of a diode laser with a wavelength of 1470 nm against the background of a time-prolonged exposure to the walls of the fistula tract improves the results of using the FiLAC technology in patients with short, complex rectal fistulas, while continuing to be a sphincter-saving treatment technology.

## References / Список литературы

- Shekhovtsov S.A. Influence of subthreshold power of the diode laser on the function of the rectal obliter during laser obliteration of rectinal fistulas by Filac technology. Journal of hepato-gastroenterology research. 2023. vol. 4, issue 2. pp. 78-80
- 2. *Shekhovtsov S.A., Davlatov S.S.* Comparative analysis of the factors influencing the results of the laser obliteration technique (Filac) in short and complex rectal fistulas// Medical Journal of Uzbekistan. 2023 №01. P. 37-42.
- 3. *Davlatov S.* et al. The choice of surgical tactics for the treatment of patients with acute paraproctitis // Journal of hepato-gastroenterological research. 2020. Vol. 1. No. 2. P. 26-29.
- 4. *Rustamov M. et al.* Results of surgical treatment of patients with acute gangrenous-necrotic paraproctitis // Journal of hepato-gastroenterological research. 2020. Vol. 1. No. 2. P. 65-68.
- 5. *Shekhovtsov S.A., Davlatov S.S.* Analysis of the impact of subthreshold powers of a diode laser with a wavelength of 1470 nm on the function of the obturator apparatus of the rectum during laser obliteration of short and complex rectal fistulas using Filac technology // Medical Journal of Uzbekistan. 2023 №01. P. 43-47.
- 6. *Shekhovtsov S.A., Davlatov S.S.* Analysis of Factors Influencing the Results of the Laser Obliteration Technique of Short and Complex Rectal Fistulas. American Journal of Medicine and Medical Sciences 2023, 13(7): -P. 913-916.
- 7. *Alexandre L*. FiLAC Fistula Tract Laser Closure: a sphincter-preserving procedure for the treatment of complex anal fistulas / L. Alexandre, F. Eduardo [et al.] // JCOL. 2012. No. 37 (2). P. 160-162.
- 8. *Alexandre L*. FiLAC Fistula Tract Laser Closure: a sphincter-preserving procedure for the treatment of complex anal fistulas / L. Alexandre, F. Eduardo [et al.] // JCOL. 2012. No. 37 (2). P. 160-162.
- Arroyo A. Fistulotomy and sphincter reconstruction in the treatment of complex fistula-in-ano: long-term clinical and manometric results / A. Arroyo, J. PérezLegaz, P. Moya. – DOI 10.1097/SLA.0b013e31824e9112.// Ann. Surg. - 2012. - No. 255 (5). – P. 935–939.
- 10. Altomare D.F. Anal Fistula closure with FiLaC: new hope or the same old story? / D.F. Altomare. DOI 10.1007/s10151-015-1347-9 // Tech Coloproctol. 2015.
- Carvalho A.L.D. FILAC. Fistula-tract laser closure: a sphincter-preserving procedure for the treatment of complex anal fistulas. / Carvalho ALD, Alves Filho EF, Alcantara RSMD, Barreto MDS // Journal of Coloproctology. -2017. - No. 37 (2). - P. 160-162.
- 12. *Fathallah N*. Treatment of fistula-in-ano with laser FiLACTM (Fistula Laser clousure): a new hope / N. Fathallah, M. Aubert, E. Pommaret, V. de Parades, N. Lemarchand. DOI 10.1007/s11725-015-0622-2 // Colon Rectum.
- 13. *Garcia-Aguilar J.* Anal fistula surgery. Factors associated with recurrence and incontinence / Garcia-Aguilar J, Belmonte C, Wong WD, Goldberg SM, Madoff RD. // Dis Colon Rectum. -1996. No. 39(7). P. 723-729.

- 14. *Giamundo P*. Fistula-tract Closure (FiLacTM): long-term results and new operative strategies /P. Giamundo, L. Esercizio // Tech. Coloproctol. 2015. No. 19. P. 449–453.
- 15. *Giamundo P*. Closure of fistula-in-ano-with laser FiLaC<sup>™</sup>: an effective novel sphincter-saving procedure for complex disease / P. Giamundo, M. Geraci [et al.] // Colorectal. disease. 2013. No. 16. P. 110–115.
- 16. Johnson E.K. Efficacy of anal fistula plug vs. fibrin glue in closure of anorectal fistulas / EK Johnson, JU Gaw, DN Armstrong // Dis. colon. Rectum. 2006. No. 49. P. 371–376.
- 17. Jordan J. Risk factors for recurrence and incontinence after anal fistula surgery / J. Jordan, V. Roig, J. Garcia-Armengol, E. Garcia-Granero, A. Solana, S. Liedo // Colorectal Dis. 2010. No. 33. P. 254–260.
- Lauretta A. Anal fstula laser closure: the length of fistula is the Achilles' heel / A. Lauretta, N. Falco, E. Stocco, R. Bellomo, A. Infantino // Tech. Coloproctol. 2018. No. 22. P. 933–939.
- Marref I. The optimal indication for FiLaC<sup>™</sup> is high trans-sphincteric fstulain-ano: a prospective cohort of 69 consecutive patients / I. Marref, L. Spindler, M. Aubert, N. Lemarchand, N. Fathallah [et al.]. DOI 10.1007/s10151-019-02077-9// Tech. Coloproctology 2019.
- 20. *Meinero P*. Video-assisted anal fistula treatment: a new concept of treating anal fistulas / P. Meinero, L. Mori, G. Gasloli. DOI 10.1097/ DCR.0000000000082 // Dis Colon Rectum. 2014. No. 57 (3). P. 354-359.
- 21. Ommer A. Gore BioA Fistula Plug in the treatment of high anal fistulas initial results from a German multicenterstudy / A. Ommer, A. Herold, A. Joos, C. Schmidt, G. Weyand, D. Bussen. – DOI 10.3205/000164 // Ger. Med.Sci. – 2012.