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**ASSESSMENT OF THE RISK OF SCAR STRICTURE OF THE ANAL CANAL  
DEPENDING ON THE CHOICE OF TREATMENT METHOD FOR  
HEMORRHOIDECTOMY**

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**Abstract:** Assessment of the risk of scar stricture of the anal canal depending on the choice of treatment method for hemorrhoidectomy

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**Relevance.** Cicatricial strictures of the anal canal or (strictures of the rectum – SAK), are a fairly common postoperative consequence of surgical treatment of varicose veins of the rectum. At the same time, paradoxical was the deterioration of the epidemiological status of SAC, which is due to the use of both standard methods of hemorrhoidectomy and more modern ones such as ultrasound dissection or LigaSure electrosurgical technique.

**Purpose of the study** . assessment of the risk of cicatricial strictures of the anal canal depending on the choice of hemorrhoidectomy method.

**Research methods.** The present study was performed on the basis of hospitalized patients in the department of the multi-profile clinic of the Multidisciplinary Clinic of the Center for the Development of Professional Qualifications of Medical Workers in Tashkent and at the private clinic “Sog`lom umr” with cicatricial strictures of the anal canal in 2011-2023. In accordance with the selection criteria, 135 (100%) patients who had previously undergone hemorrhoidectomy for varicose veins of the rectum and had a clinically confirmed diagnosis of postoperative cicatricial stricture of the anal canal were included in the clinical observational study.

**Conclusion** . Conclusion. The most common factor increasing the risk of SAC, however, remains the classic hemorrhoidectomy using the Milligan-Morgan method ( $p < 0.001$ ). In addition, the use of this method of surgical treatment of varicose veins of the rectum, at least 2 times more often leads to AS ( $p < 0.001$ ).

The improved method of laser hemorrhoidectomy proposed by us allows to reduce the risk of recurrence by 46.4%, and also has significant economic efficiency ( $p < 0.001$ ).

**Key words** : anal canal stricture, perianal flap anoplasty, laser hemorrhoidectomy, classical hemorrhoidectomy using the Milligan-Morgan method.

**Relevance of the problem** . Cicatricial strictures of the anal canal or (rectal strictures - RS) are a fairly common postoperative consequence of surgical treatment of varicose veins of the rectum [1,3]. At the same time, paradoxical was the deterioration in the epidemiological status of RS, which is due to the use of both standard hemorrhoidectomy methods and more modern ones such as ultrasound dissection or LigaSure electrosurgical equipment [1,2]. The fact is that modern methods of hemorrhoidectomy have a high - power traumatic effect on the tissue of the rectum, which in turn leads to increased processes of formation of fibrous-scar tissue [1,4]. As a result, the risk of scarring in the rectal tissue is typical for both classical and modern types of hemorrhoidectomy .

**The purpose of the study is to assess the risk of scar strictures of the anal canal depending on the choice of hemorrhoidectomy method .**

**Research methods.** The present study was performed on the basis of hospitalized patients in the department of the multi-profile clinic of the Multidisciplinary Clinic of the Center for the Development of Professional Qualifications of Medical Workers in Tashkent and at the private clinic “Sog`lom umr” with cicatricial strictures of the anal canal in 2011-2023. In accordance with the selection criteria, 135 (100%) patients who had previously undergone hemorrhoidectomy for varicose veins of the rectum and had a clinically confirmed diagnosis of postoperative cicatricial stricture of the anal canal were included in the clinical observational study. The mean age of study participants was 41.0 years (range: 18 to 74 years). Among the patients included in the study, there were 64 (47.4%) women and 71 (52.6%) men. Among the main causes of cicatricial strictures of the anal canal in 105 (77.8%) cases was classical hemorrhoidectomy using the Milligan -Morgan method . In 15 (11.1%) cases, the cause of RS was the electrosurgical technique of hemorrhoidectomy using the LigaSure<sup>®</sup> system , and in 15 (11.0%) cases, the cause of strictures was hemorrhoidectomy using a surgical laser. As a surgical mechanism for eliminating RS, patients were divided into 2 groups: Group I - 68 (50.4%) patients who received removal of anal strictures using a surgical laser; Group II – 67 (49.6%) patients who underwent perianal flap anoplasty of anal strictures.

To optimize the analysis of the relationship between the type of hemorrhoidectomy and the characteristics of ACS, we have proposed a classification of anal strictures. According to the degree of severity, we distinguish compensated, sub- and decompensated strictures. Compensated strictures included narrowing of the anal canal up to 1.5 cm in diameter with a decrease in its elasticity. With subcompensated strictures, the narrowing of the diameter of the anal canal ranged from 0.5 to 1.5 cm with difficulty in emptying the rectum, but with the possibility of independent stool. A decompensated stricture was considered to be a narrowing with a diameter of the anal canal of less than 0.5 cm with the need to take laxatives or use cleansing enemas to empty the rectum. Based on the level of location in the anal canal, we divide strictures into extended, involving the entire anal canal, and limited, occupying part of it. The latter, in turn, are divided into low, with the localization of the narrowing zone below 0.5 cm from the dentate line, medium, with a location at the level of the dentate line, and high, with localization above 0.5 cm from the dentate line. In addition, it is necessary to take into account the location of the scar process around the circumference of the anal canal. We distinguish gradations of strictures involving up to 1/2 the circumference of the anal canal, from 1/2 to 2/3 of the circumference, and circular strictures with scar changes along the entire circumference of the anus.

The data analysis within the study was carried out using specialized methods of biomedical statistics. Thus, quantitative indicators were assessed using the Shapiro- Wilk test . In the absence of a normal distribution, quantitative data were described using the median (Me) and intraquartile range [ IQR : Q 1- Q 3]. Categorical data were described as absolute or proportional values. Comparison of two groups for quantitative indicators whose distribution differed from normal was performed using the Mann-Whitney U test. Proportional comparisons in the analysis of multifield contingency tables were assessed using the Pearson chi-square test. A prognostic model characterizing the dependence of a quantitative variable on factors was developed using the linear regression method . The construction of a prognostic model of the probability of a certain outcome was carried out using the logistic regression method using the Nigekirk  $R^2$  coefficient . Differences were considered statistically significant at  $p < 0.05$  . The results of the analysis of the dependence of cases of cicatricial strictures of the anal canal on the type of previously undergone hemorrhoidectomy : among participants in group I , in 53 (77.9%) cases, the cause of cicatricial stricture was a previously undergone hemorrhoidectomy using the Milligan -Morgan method , in 6 (8.8% ) – hemorrhoidectomy was performed using an electrosurgical technique using the LigaSure™ device; in 9 (13.2%) cases, the cause of strictures was hemorrhoidectomy performed using a surgical laser. In group II , among 52 (77.6%) patients, the cause of cicatricial stricture was Milligan - Morgan hemorrhoidectomy , in 9 (13.4%) - electrosurgical hemorrhoidectomy , and in 6 (9.0%) - laser hemorrhoidectomy ( $r = 0.832$ ), (see Table 1).

**Table 1**

Analysis of the causes of scar stricture depending on the group of study participants

Index	Categories	Group		P
		Group I	Group II	
Cause of scar stricture	Milligan - Morgan hemorrhoidectomy	53 (77.9)	52 (77.6)	0.548
	Electrosurgical hemorrhoidectomy	6 (8.8)	9 (13.4)	
	Laser hemorrhoidectomy	9 (13.2)	6 (9.0)	

The results of the analysis of the causes of cicatricial strictures of the anal canal demonstrated that no statistically significant differences could be identified between the study participants depending on the group. However, the most common cause and consequence of scar strictures of the anal canal among study participants, regardless of group, was hemorrhoidectomy using the Milligan -Morgan method. Thus, when analyzing the proportional ratio, more than 70.0% of patients, both groups I and II , had strictures precisely after the classical method of hemorrhoidectomy .

However, the result obtained is quite predictable and obvious. However, when analyzing the degree of scar stricture and its relationship between previously performed hemorrhoidectomy techniques , a certain pattern was noted . Thus, the phenomenon of compensated (1st degree) cicatricial stricture of the anal canal was noted in 49 (77.8%) cases after hemorrhoidectomy according to Milligan -Morgan, in 11 (17.5%) cases with the electrosurgical method of

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hemorrhoidectomy , and in 3 (4. 8%) cases with laser hemorrhoidectomy . Subcompensated (grade 2) stricture, in 36 (78.3%) cases was a complication of hemorrhoidectomy according to Milligan -Morgan, in 4 (8.7%) cases it was a consequence of electro-surgical hemorrhoidectomy , and in 6 (13.0%) - a consequence laser hemorrhoidectomy .

And finally, decompensated (grade 3) scar stricture was a complication of hemorrhoidectomy using the Milligan -Morgan method in 20 (76.9%) cases, as well as in 6 (23.1%) cases with laser hemorrhoidectomy (see Table 2).

The data obtained demonstrated patterns regarding the severity of postoperative cicatricial stricture of the anal canal and its connection with the method of hemorrhoidectomy . Thus, as in cases with the very fact of the occurrence of cicatricial strictures, analysis of the severity of these phenomena most often (more than 70.0%) arises when choosing surgical treatment of varicose veins of the rectum using hemorrhoidectomy according to Milligan -Morgan ( $p = 0.124$  ).

**table 2**

Analysis of the degree of scar stricture depending on the method of previously performed hemorrhoidectomy

Index	Categories	Degree of anal stricture			P
		1 tbsp.	2 tbsp.	3 tbsp.	
Cause of cicatricial stenosis	Milligan - Morgan hemorrhoidectomy	49 (77.8)	36 (78.3)	20 (76.9)	0.124
	Electrosurgical hemorrhoidectomy	11 (17.5)	4 (8.7)	0 (0.0)	
	Laser hemorrhoidectomy	3 (4.8)	6 (13.0)	6 (23.1)	

A comparative analysis of the severity of scar strictures depending on the group of study participants demonstrated that it was not possible to identify significant differences between the degree of stricture and the group of the patient in the study ( $p = 0.687$ ). Among patients with a clinical picture of compensated cicatricial stricture of the anal canal, there were 30 (44.1%) participants in group I , and 33 (49.3%) participants in group II of the study. In cases with subcompensated stricture, 23 (33.8%) participants were identified from group I and 23 (34.3%) for group II . In cases with decompensated scar stricture, 15 (22.1%) patients were identified in group I and 11 (16.4%) in group II (see Table 3).

**Table 3**

Analysis of the degree of anal stricture depending on the group of study participants

Index	Categories	Group		P
		Group I	Group II	
Degree of anal stricture	1 tbsp.	30 (44.1)	33 (49.3)	0.687
	2 tbsp.	23 (33.8)	23 (34.3)	
	3 tbsp.	15 (22.1)	11 (16.4)	

The data obtained demonstrated the fact that even when patients are randomized into groups of surgical intervention, the specificity of complications associated with previously performed hemorrhoidectomy has clear patterns. Thus, among the study participants, depending on the group, in most cases (more than 70.0%), strictures of the anal canal of compensated and subcompensated degrees were noted. In addition, an analysis was carried out of the time period from the moment of hemorrhoidectomy and the occurrence of clinical symptoms of cicatricial stricture of the anal canal among study participants. This analysis made it possible to determine that the shortest period for the occurrence of clinically significant phenomena of scar stricture was 9 months. [ IQR : 4.0 – 16.0 months], for patients with compensated and decompensated stricture. Which is more than 30.0% shorter period compared to 12 months. [ IQR : 6.0 – 16.0 months] among patients with subcompensated degree of stricture (p=0.484), (see Table 4).

**Table 4**

Analysis of the period of occurrence of clinically significant manifestations of cicatricial stricture of the anal canal after hemorrhoidectomy among study participants

Index	Categories	Time of onset of symptoms (months)			p
		Me	Q <sub>1</sub> – Q <sub>3</sub>	n	
Degree of anal stricture	1 tbsp.	9.0	4.0 – 14.0	63	0.484
	2 tbsp.	13.0	6.0 – 16.0	46	
	3 tbsp.	9.0	4.0 – 16.0	26	

The data obtained when analyzing the period of occurrence of symptomatic manifestations of cicatricial changes in the rectum after a previous hemorrhoidectomy demonstrated that the most rapidly developing clinical picture is characteristic of both the compensated and decompensated stages of cicatricial stricture. In this connection, it was concluded that the values of the time period from the first day after hemorrhoidectomy to clinically significant manifestations of cicatricial stricture of the anal canal do not have significant clinical significance and do not correlate with the stage of cicatricial changes. When analyzing data on the presence of anal canal stenosis depending on the type of previously undergone hemorrhoidectomy, identical results were obtained among the participants in this study. Thus, stenosis of the anal canal was detected in 76 (76.8%) cases after hemorrhoidectomy according to Milligan -Morgan, in 11 (11.1%) cases after electrosurgical hemorrhoidectomy, and in 12 (12.1%) cases after laser hemorrhoidectomy ( p=0.823), (see Table 5).

**Table 5**

Analysis of cases of anal stenosis depending on previous surgical intervention

Index	Categories	Anal stenosis		p
		Availability	Absence	
Cause of stenosis	Milligan - Morgan hemorrhoidectomy	76 (76.8)	29 (80.6)	0.823

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Electrosurgical technique for hemorrhoidectomy	11 (11.1)	4 (11.1)	
Hemorrhoidectomy using laser surgery	12 (12.1)	3 (8.3)	

In cases with anal stenosis in more than 70.0% of cases, the occurrence of this complication was associated with complications of hemorrhoidectomy according to the Milligan -Morgan method, which emphasized the previously made conclusions that more modern and technological methods of intervention on the rectum have a high level safety and effectiveness.

As a result of analyzing the dependence of the occurrence of cicatricial strictures of the anal canal on the method of hemorrhoidectomy , we identified a clearly visible trend in favor of the standard method of hemorrhoidectomy according to Milligan -Morgan. At the same time, with respect to electrosurgical hemorrhoidectomy using “LigaSure™” and laser hemorrhoidectomy , significantly more favorable outcomes were noted, both in cases of the direct presence of postoperative cicatricial stenosis, and in cases of correlation between the occurrence of cicatricial changes in the rectum and the severity of strictures. Thus, patients who have undergone hemorrhoidectomy Milligan -Morgan had 3.092 times higher odds of postoperative scarring and 2.185 times higher odds of having more severe strictures compared with patients who underwent electrosurgical and laser hemorrhoidectomy [95%CI: 1.213 – 8.460], ( p < 0.001). As for such a formidable complication of hemorrhoidectomy as anal stenosis, then, provided that hemorrhoidectomy is performed using the Milligan -Morgan method, this type of complication occurs at least 2 times more often in comparison with more modern types of surgical treatment of varicose veins of the rectum.

**Conclusion** . The most common factor that increases the risk of developing SA is still the classic hemorrhoidectomy according to the Milligan -Morgan method ( p < 0.001).

**Inference:**

1. The use of this method of surgical treatment of varicose veins of the rectum leads to AS at least 2 times more often ( p < 0.001).
2. The improved method of laser hemorrhoidectomy we proposed allows us to reduce the risk of relapse by 46.4%, and also has significant economic efficiency ( p < 0.001).

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