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# Predictors of anal incontinence in patients with perianal fistulizing Crohn's disease

Ivan S. Anosov[1], Tatyana A. Eryshova[1], Roman Yu. Khryukin[1], Oksana Yu. Fomenko[1], Evgeniy S. Harlamochkin[2], Alexandr Yu. Titov[1]

[1]Ryzhikh National Medical Research Center of Coloproctology (Salyama Adilya st., 2, Moscow, 123423, Russia)
[2]AO «NPO «Poisk» Moscow branch (Clara Cetkin st., 18/2, Moscow, 127299, Russia)

**ABSTRACT** *AIM: to identify risk factors affecting the anal incontinence (AI) in Crohn's disease.*
*PATIENTS AND METHODS: a retrospective study included 191 patients with perianal fistulizing Crohn's disease in February 2017 — September 2024. Sphincter function was assessed via Wexner's scale and sphincterometry. The incontinence symptoms were revealed in 118/155 (76%) patients. AI according sphincterometry was fixed in 175/191 (90%) cases. Associations were examined between: clinical/ anamnestic parameters, incontinence symptoms, anal sphincter insufficiency (sphincterometry -confirmed), and risk factor effects on sphincter tone/voluntary contraction.*
*RESULTS: previous anal surgery, regardless of the number of operations, increases the likelihood of AI confirmed by sphincterometry (odds ratio (OR) = 4.1; 95% confidence interval (CI): 1.27–13.2; p = 0.02). When analyzing individual sphincterometry data, the effect of the duration of the perianal disease (OR = 1.11; 95% CI: 1–1.22; p = 0.04) and the number of fistula-related abscesses (OR = 1.49; 95% CI: 1.13–1.97; p = 0.005) on the reduction of maximum anal squeeze pressure was revealed. According to data obtained, the risk of a decrease in the maximum anal squeeze pressure increased in patients with chronic perianal lesions for more than 5.5 years (OR = 2.74; 95% CI:1.24–6.06, p = 0.012), as well as in patients with 2 or more actively draining collections (OR = 2.36; 95% CI:1.39–4.31, p = 0.005).*
*CONCLUSION: analysis of predictors for anal incontinence in patients with Crohn's disease-related perianal lesions will help develop optimal treatment strategy for these patients, thus highlighting the need for further research in this area.*

**KEYWORDS:** *Crohn's disease, anal sphincter insufficiency, anal incontinence, sphincterometry, perianal fistulizing Crohn's disease, PFCD*

**CONFLICT OF INTEREST:** *the authors declare no conflict of interest*

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**ADDRESS FOR CORRESPONDENCE:** *Tatyana A. Eryshova, Ryzhikh National Medical Research Center of Coloproctology, Salyama Adilya st., 2, Moscow, 123423, Russia; e-mail: teryshova.7@gmail.com*

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## INTRODUCTION

The prevalence of perianal fistular disease Crohn's disease ranges from 25% to 28% [1]. Most often, patients with Crohn's disease (CD) develop complex anal fistulas, involving portions of the external sphincter of the rectum to varying degrees [2]. The quality of life of this category of patients is significantly reduced, primarily due to the high incidence of anal incontinence (AI) [3,4]. Given the chronic, recurrent nature of the disease, the function of the sphincter in patients with CD is often compromised not only due to the widespread purulent-inflammatory process, but also due to repeated surgeries in the perianal area. Other predisposing factors of incontinence may be chronic inflammation of the rectum, changes in stool consistency, and functional defecation difficulties [5]. According to a survey of members of the British Association of Patients with Inflammatory Bowel Diseases (IBD), 74% of the surveyed patients experienced a violation of intestinal contents retention [6]. Recently, anal incontinence in patients with CD has not been sufficiently studied, and only a limited number of publications devoted to this problem have conducted an instrumental

**Table 1.** *Clinical features of the patients enrolled in the study*

| Parameters | Patients, N = 191 Me (Q1; Q3), (min–max) |
|---|---|
| Age (years) | 32 (24;41), (18–75) |
| BMI (kg/m$^2$) | 22.8 (19.6; 26) (14;101) N = 184 |
| CD history (years) | 4 (2; 7), (1–29) |
| History of perianal fistular disease CD (years) | 2 (1; 4), (1–19) |

assessment of the retention function [7]. So, the aim of the study was to clarify risk factors of anal incontinence in patients with PFCD.

## PATIENTS AND METHODS

The data of 191 patients with perianal fistular disease CD, who were hospitalized from February 2017 to September 2024, were retrospectively analyzed. The study included patients with anal fistulas who were scheduled to undergo surgery (Table 1,2). Out of the patients included in the study, there were 109 (57%) men and 82 (43%) women. Young patients prevailed — the median age was 32 (24; 41) years. 55% of patients (105/191) had a history of surgeries for perianal manifestations of CD, while in 60% (62/105) of cases, only dissection of acute paraproctitis was performed. Among the other surgeries in the history of the disease were: fistulectomy — 28% (30/105); abscess opening with seton — 9% (10/105); rectal advancement flap — 2% (2/105); laser thermal obliteration of the fistula track — 1% (1/105). At the same time, several different procedures could be performed in one patient.

In a survey of patients according to the Cleveland Wexner Scale of Anal Incontinence (0 points — absence of clinical insufficiency of the anal sphincter, 20 points — complete incontinence), symptoms of incontinence were noted by 118/155 (76%) patients (N = 155; Me = 3 (1; 8), (0–16)). In 36/191 (18%) patients, this indicator was not evaluated due to the presence of a stoma or due to the lack of data in medical documentation. In addition to the standard examination of coloproctological patients, comprehensive instrumental diagnostics was performed, including colonoscopy

**Table 2.** *Clinical and anamnestic data of patients en rolled in the study*

| Parameters | Patients, N = 191 n(%) |
|---|---|
| Gender | |
| Female | 82 (43) |
| Male | 109 (57) |
| Abdominal surgery for a complicated history of CD | |
| Yes | 82 (43) |
| No | 109 (57) |
| Stoma | |
| Yes | 19 (10) |
| No | 172 (90) |
| Stoma type | |
| Ileostomy | 9/19 (47) |
| Colostomy | 10/19 (53) |
| CD colonoscopy activity | |
| Yes | 164 (86) |
| Remission | 27 (14) |
| CD colonoscopy activity (form) | |
| Ileitis | 37/164 (23) |
| Ileocolitis | 54/164 (33) |
| Colitis | 73/164 (44) |
| Therapy before surgery | |
| 5-ASA | 30 (16) |
| Steroids | 48 (25) |
| Immunosuppressive therapy | 37 (19) |
| Biological therapy | 46 (24) |
| Without bio | 30 (16) |
| Surgery for perianal fistular disease in the history | |
| Yes | 105 (55) |
| No | 86 (45) |
| Surgery type | |
| Abscess opening | 62/105 (59) |
| Fistulectomy | 30/105 (29) |
| Opening of additional fistula tracks with seton | 10/105 (9) |
| Rectal advancement flap | 2/105 (2) |
| Laser thermal obliteration | 1/105 (1) |
| Number of fistulas in one patient | |
| 1 | 125 (65) |
| 2 | 51 (27) |
| 3 | 10 (5) |
| The system of fistula tracks | 5 (3) |
| Fistula type | |
| Intrasphincteric | 20 (11) |
| Transsphincteric | 68 (36) |
| Extrasphincteric | 85 (44) |
| Rectovaginal | 18 (9) |
| Depth of the transsphincteric fistula | |
| subcutaneous part | 40/68 (59) |
| superficial part | 23/68 (34) |
| deep portion | 5/68 (7) |
| Location of the fistula | |
| Posterior | 73 (38) |
| Lateral | 12 (6) |
| Anterior | 59 (31) |
| More than 1 fistula | 47 (25) |
| Proctitis (as per Ultrasound) | |
| Yes | 89 (47) |
| No | 102 (53) |
| Additional abscesses (number) | |
| 0 | 37 (19) |
| 1 | 69 (36) |
| 2 | 47 (24) |
| 3 and more | 38 (21) |
| The degree of AI (as per sphincterometry) | |
| 0 | 16 (8) |
| 1 | 115 (60) |
| 2 | 52 (27) |
| 3 | 8 (5) |

**Table 3.** *Staging of anal incontinence according to sphincterometry*

| Indicator (mm Hg) | AP ACr | | MP ACv | |
|---|---|---|---|---|
| Gender | Females | Males | Females | Males |
| Norm | 41–63 | 43–61 | 110.0–178.0 | 121–227 |
| AI 1degree | 36.3–40.0 | 32.8–42.0 | 97.4–109.0 | 115.0–120.0 |
| AI 2 degree | 26.9–36.2 | 25.3–32.7 | 61.9–97.3 | 74.9–114.9 |
| AI 3 degree | ⩽ 26.8 | ⩽ 25.2 | ⩽ 61.8 | ⩽ 74.8 |

**Table 4.** *Sphincterometry measurements in study participants*

| Parameters | Patients, N = 191<br>Me (Q1; Q3), (min–max) |
|---|---|
| AP ACr | 38 (34;40), (13–76) |
| MP ACv | 127 (99;166), (39–312) |

and gastroscopy, CT enterography and/or abdominal ultrasound, transrectal ultrasound (TRUS) and sphincterometry. The topographical and anatomical features of perianal fistular disease of interest were the location of the fistula relative to the external sphincter and the number of fistula-related abscesses. Objective diagnosis of anal incontinence was performed by sphincterometry (Table3) [8]. In accordance with the regulatory indicators of sphincterometry defined at the RNMRC of Coloproctology of the Ministry of Health of Russia, 175/191 (92%) patients had AI of various degrees: 115/191 (60%) cases had AI of the 1st degree, 52/191 (27%) had AI of the 2nd degree, and 8/191 (5%) patients had AI of the 3rd degree (Table 4).

### *Statistical Analysis*

The data analyzed in the study was entered into a spreadsheet Microsoft Excel 2019 for Windows. Quantitative data is represented by the median (Me), the lower and upper quartiles (Q1; Q3), as well as the minimum and maximum values (min-max). The identification of risk factors for insufficiency was performed using binary logistic regression, a univariate analysis of clinical and anamnestic parameters was performed, the results were presented by the odds ratio (OR) and a 95% coincidence interval calculated using Wald's method. With a statistically significant level of differences ($p < 0.05$), these parameters were included in a multivariate analysis. A ROC analysis was also performed, which assessed the area under the ROC curve (AUC), its standard deviation, 95% CI, and significance level. The cut-off point was determined by Yoden's criterion; the sensitivity, specificity, and 95% CI were calculated by Klopper-Pearson's method). All statistical data analysis was performed in the Statistica 13.3 program (TIBCO Software Inc., USA), with the exception of the *ROC* analysis performed in GraphPadPrism for MacOS (GraphPad Software, Inc., USA).

## RESULTS

### Risk factors for clinical AI

The univariate analysis of risk factors revealed that body mass index (OR = 0.96; 95% CI: 0.93–0.99; $p = 0.02$) and the number of fistula-related abscesses (OR = 1.51; 95% CI: 1.06–2.16; $p = 0.02$) are associated with the development of clinical anal incontinence (Table 5).

The multivariate analysis of risk factors confirmed the effect of only body mass index (OR = 0.97; 95% CI: 0.93– 0.99; $p = 0.03$) on the anal incontinence (Table 6).

The *ROC* curve of clinical AIand body mass index is constructed, the area under the curve (AUC) is 0.532 ($p = 0.55$), the cut-off point corresponds to 23.75 kg/m². The univariate analysis of the obtained cut-off point revealed the absence of a significant relationship between body mass index and clinical AI (OR = 1.62; 95% CI: 0.7–3.75; $p = 0.25$) (Fig.1).

### Risk factors for AI according to sphincterometry

According to the data obtained, the presence of a history of surgery for perianal manifestations significantly increases the risk of AI (OR = 4.1; 95%

**Table 5.** *Unifactorial analysis of parameters influencing the development of clinical anal incontinence*

| Factors | OR (95%CI) | *p* |
|---|---|---|
| Age (years) | 1.01 (0.98–1.05) | 0.35 |
| BMI (kg/m²) | 0.96 (0.93–0.99) | 0.02 |
| Duration of IBD history (years) | 1 (0.94–1.08) | 0.89 |
| Duration of the history of perianal fistular disease (years) | 1.06 (0.94–1.21) | 0.35 |
| The presence of concomitant diseases<br>No<br>Yes | <br>1<br>0.91 (0.42–1.95) | 0.8 |
| History of abdominal surgery (number) | 0.91 (0.71–1.17) | 0.47 |
| Abscess opening in history | 1.15 (0.83–1.59) | 0.41 |
| Surgery for perianal fistular disease in history<br>No<br>Yes | <br>1<br>1.43 (0.68-3) | 0.34 |
| Surgery for perianal fistular disease in history (number) | 1.39 (0.72–2.7) | 0.33 |
| Number of fistulas | 1.6 (0.87–2.92) | 0.13 |
| Proctitis<br>No<br>Yes | <br>1<br>1.99 (0.94–4.23) | 0.07 |
| The presence of fistula-related abscesses<br>No<br>Yes | <br>1<br>2.2 (0.87–5.6) | 0.09 |
| Number of fistula-related abscesses | 1.51 (1.06–2.16) | 0.02 |
| Steroids in take<br>No<br>Yes | <br>1<br>1.67 (0.69–3.97) | 0.26 |
| Crohn's disease colonoscopy activity | 0.66 (0.18–2.42) | 0.53 |
| Form of Crohn's disease<br>Ileitis<br>Ileocolitis<br>Colitis | <br>1<br>1.15 (0.41–3.18)<br>1.23 (0.48–3.13) | 0.79<br>0.67 |

**Table 6.** *Multifactorial analysis of parameters influencing the development of clinical anal incontinence*

| Factors | OR (95%CI) | *p* |
|---|---|---|
| ИМТ BMI | 0.97 (0.93–0.99) | 0.03 |
| Number of fistula-related abscesses | 1.42 (0.98–2.04) | 0.06 |

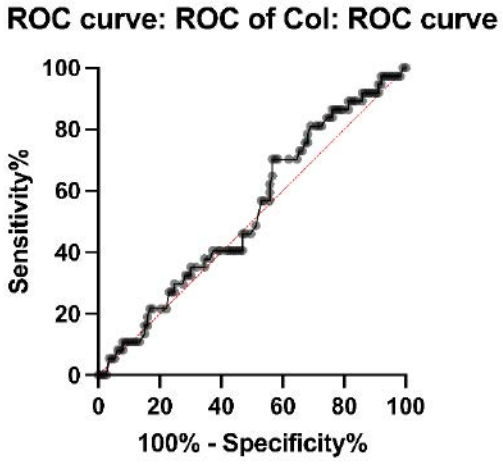


**Figure 1.** *ROC is the curve of clinical AI versus body mass index (BMI). AUC = 0.532 ± 0.053 (95% CI: 0.428 — 0.64); p = 0.55, cut-off point corresponds to 23.75 kg/m². Sensitivity = 70.3% (95% CI: 54.2–82.5%). Specificity = 43.4% (95% CI: 34.6–52.6%)*

CI: 1.27–13.2; $p = 0.02$), regardless of the number of previous procedures (Table 7).

**Factors influencing the decrease in the mean pressure in the anal canal at rest (AP ACr)**

The mean pressure in the anal canal at rest characterizes the tonic tension of the internal sphincter. In 173/191 (91%) cases, it was reduced. Normal values were detected in 16/191 (8%) patients, elevated values in 2/191 (1%) patients. There was no significant relationship between the value of this parameter and the risk factors studied (Table 8).

**Factors influencing the reduction of maximum pressure in the anal canal during voluntary contraction (MP ACv)**

**Table 7.** *Unifactorial analysis of parameters influencing the development of AI according sphincterometry*

| Factors | OR (95% CI) | *p* |
|---|---|---|
| Gender<br>Female<br>Male | <br>1<br>1.04 (0.37–2.9) | 0.94 |
| Age | 1.03 (0.98–1.08) | 0.19 |
| BMI (kg/m²) | 1.04 (0.94–1.15) | 0.41 |
| Duration of Crohn's disease history (years) | 1.07 (0.94–1.22) | 0.31 |
| Duration of the history of perianal fistular disease (years) | 1.1 (0.9–1.37) | 0.32 |
| The presence of comorbidities<br>No<br>Yes | <br>1<br>2.32 (0.64–8.45) | 0.2 |
| The presence of a stoma<br>No<br>Yes | <br>1<br>1.94 (0.24–15.4) | 0.53 |
| The presence of a stoma (months) | 1.01 (0.89–1.14) | 0.89 |
| History of abdominal surgery (number) | 0.89 (0.65–1.23) | 0.49 |
| Opening of perianal abscess (number) | 1.22 (0.73–2.02) | 0.45 |
| Surgery for perianal fistular disease in history<br>No<br>Yes | <br>1<br>4.1 (1.27–13.2) | 0.02 |
| Surgery for perianal fistular disease in history (number) | 2.03 (0.64–6.45) | 0.23 |
| Number of fistulas | 0.94 (0.5–1.77) | 0.85 |
| Proctitis<br>No<br>Yes | <br>1<br>1.16 (0.42–32.4) | 0.77 |
| The presence of fistula-related abscesses<br>No<br>Yes | <br>1<br>1.68 (0.51–5.57) | 0.39 |
| Fistula-related abscesses (number) | 1.14 (0.73–1.78) | 0.55 |
| Steroids in take<br>No<br>Yes | <br>1<br>6.17 (0.79–47.94) | 0.08 |
| Crohn's disease colonoscopy activity<br>No<br>Yes | <br>1<br>0.86 (0.18–4) | 0.84 |
| A form of Crohn's disease<br>Ileitis<br>Ileocolitis<br>Colitis | <br>1<br>0.57 (0.14–2.28)<br>1.33 (0.3–5.86) | 0.42<br>0.7 |

**Table 8.** *Unifactorial analysis of parameters influencing the development of decrease of average anal resting pressure*

| Factors | OR (95% CI) | *p* |
|---|---|---|
| Gender<br>Female<br>Male | 1<br>1.57 (0.52–3.62) | 0.53 |
| Age | 1.02 (0.98–1.06) | 0.38 |
| BMI (kg/m²) | 1.02 (0.96–1.09) | 0.57 |
| Duration of Crohn's disease history (years) | 1.1 (0.96–1.27) | 0.16 |
| Duration of the history of perianal fistular disease (years) | 1.12 (0.92– 1.38) | 0.26 |
| The presence of comorbidities<br>Yes<br>No | <br>1<br>0.74 (0.25–2.18) | 0.58 |
| The presence of a stoma<br>Yes<br>No | <br>1<br>0.45 (0.06–3.57) | 0.45 |
| The presence of a stoma (months) | 1 (0.89–1.14) | 0.89 |
| History of abdominal surgery (number) | 1 (0.71–1.42) | 0.98 |
| Surgery for perianal fistular disease in history<br>No<br>Yes | <br>1<br>2.05 (0.76–5.55) | 0.16 |
| Surgery for perianal fistular disease in history (number) | 1.68 (0.68–4.2) | 0.27 |
| Dissection of paraproctitis (number) | 1.06 (0.7–1.62) | 0.78 |
| Number of fistulas | 1.17 (0.58–2.35) | 0.56 |
| The presence of fistula-related abscesses<br>No<br>Yes | <br>1<br>1.99 (0.66–6.03) | 0.22 |
| Fistula-related abscesses (number) | 1.25 (0.8–1.93) | 0.33 |
| Steroids intake<br>Yes<br>No | <br>1<br>0.31 (0.07–1.39) | 0.12 |
| Crohn's disease colonoscopy activity<br>No<br>Yes | <br>1<br>1.24 (0.33–4.61) | 0.75 |
| Form of Crohn's disease<br>Ileitis<br>Ileocolitis<br>Colitis | <br>1<br>0.32 (0.07–1.57)<br>0.6 (0.12–3.03) | 0.16<br>0.54 |

The MP Acv value was reduced in 69/191 (36%) patients, in 108/191 (57%) patients it was within the normal range. The univariate analysis revealed that the decrease in maximum pressure in the anal canal with voluntary contraction is significantly influenced by: the duration of the history of perianal fistular disease Crohn's disease (OR = 1.14; 95% CI: 1.05–1.25; $p$ = 0.003), the presence of a stoma (OR = 0.38; 95% CI: 0.15–0.95; $p$ = 0.039), the number of operations for perianal fistulas in history (OR = 1.56; 95% CI: 1.11–2.17; $p$ = 0.009),

**Table 9.** *Unifactorial analysis of parameters influencing the development of decrease of maximum incremental anal squeeze pressure*

| Factors | OR (95% CI) | *p* |
|---|---|---|
| Gender<br>Female<br>Male | <br>1<br>0.73 (0.4–1.33) | 0.3 |
| Age | 1.02 (0.99–1.04) | 0.09 |
| BMI (kg/m²) | 0.98 (0.93–1.01) | 0.16 |
| Duration of Crohn's disease history (years) | 0.99 (0.94–1.06) | 0.93 |
| Duration of the history of perianal fistular disease (years) | 1.14 (1.05–1.25) | 0.003 |
| The presence of concomitant pathology<br>Yes<br>No | <br>1<br>0.83 (0.44–1.54) | 0.55 |
| The presence of a stoma<br>Yes<br>No | <br>1<br>0.38 (0.15–0.95) | 0.039 |
| The presence of a stoma (months) | 0.98 (0.92–1.03) | 0.38 |
| History of abdominal surgery (number) | 0.97 (0.78–1.2) | 0.77 |
| Surgery for perianal fistular disease in history<br>No<br>Yes | <br>1<br>1.46 (0.8–2.65) | 0.22 |
| Surgery for perianal fistular disease in history (number) | 1.56 (1.11–2.17) | 0.009 |
| Dissection of paraproctitis (number) | 1.09 (0.86–1.39) | 0.45 |
| Number of fistulas | 1.33 (0.91–1.93) | 0.14 |
| The presence of fistula-related abscesses<br>No<br>Yes | <br>1<br>1.63 (0.71–3.75) | 0.25 |
| Fistula-related abscesses (number) | 1.48 (1.15–1.91) | 0.002 |
| Steroids intake<br>Yes<br>No | <br>1<br>1.39 (0.7–2.74) | 0.35 |
| Crohn's disease colonoscopy activity<br>No<br>Yes | <br>1<br>1.15 (0.49–2.73) | 0.74 |
| Form of Crohn's disease<br>Ileitis<br>Ileocolitis<br>Colitis | <br>1<br>1.09 (0.47–2.52)<br>1.33 (0.61–2.93) | 0.84<br>0.48 |

the number of fistula-related abscesses (OR = 1.48; 95% CI: 1.15–1.91; $p = 0.002$) (Table 9).

The multivariate analysis revealed that the duration of the history of perianal fistular disease Crohn's disease (OR = 1.11; 95% CI: 1–1.22; $p = 0.04$) and the number of fistula-related abscesses were significantly associated with a decrease in MP ACv levels (OR = 1.49; 95% CI%: 1.13–1.97; $p = 0.005$) (Table 10).

**Table 10.** *Multifactorial analysis of parameters influencing the development of decrease of maximum incremental anal squeeze pressure*

| Factors | OR (95% CI) | *p* |
|---|---|---|
| Duration of the history of perianal fistular disease (years) | 1.11 (1–1.22) | 0.04 |
| Number of fistula-related abscesses | 1.49 (1.13–1.97) | 0.005 |
| Surgery for perianal fistular disease in history (number) | 1.14 (0.77–1.69) | 0.5 |
| The presence of a stoma | 0.39 (0.14–1.14) | 0.08 |

The *ROC* curve of MP ACv dependence on the number of fistula-related abscesses is constructed, the cut-off point is 2 and more fistula-related abscesses, AUC = 0.616 ($p = 0.007$). As the fistula-related abscesses increase (2 and more), the risk of reducing the maximum pressure in the anal canal increases with voluntary contraction (OR = 2.36; 95% CI: 1.39–4.31, $p = 0.005$) (Fig.2).

The *ROC* curve of MP ACv dependence on the duration of the history of perianal fistular disease CD is constructed, the cut-off point corresponds to the indicator of more than 5.5 years, the area under

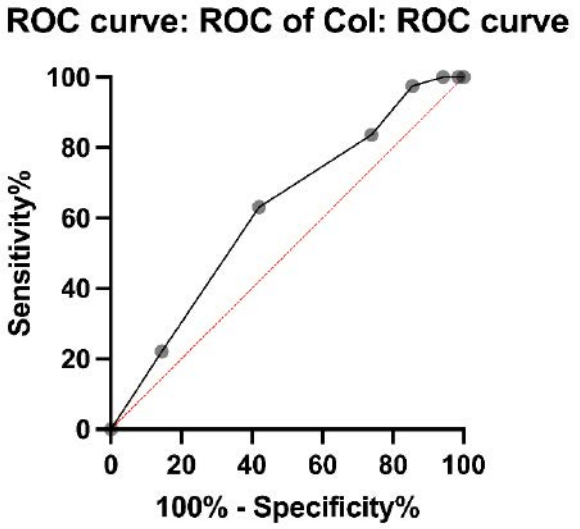


**Figure 2.** *ROC is the curve of maximum incremental anal squeeze pressure versus numbers of fistula-related abscesses. AUC = 0.616 ± 0.043 (95% CI: 0.532–0.7); p = 0.007, cut-off point to2 or more actively draining collections. Sensitivity = 63.1% (95% CI 54.2–71.1%). Specificity = 57.9% (95% CI46.2–68.9%)*

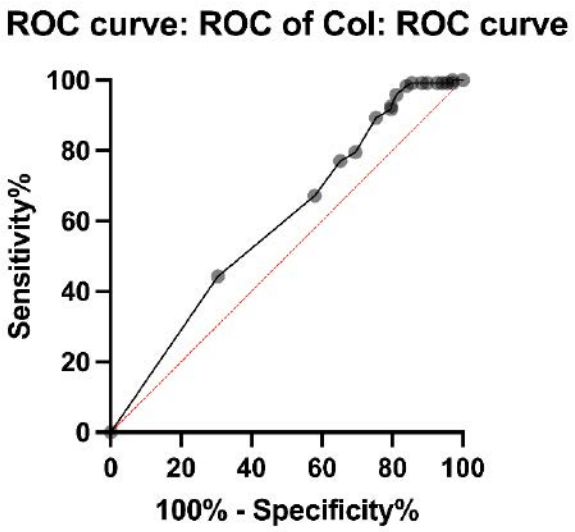


**Figure 3.** *ROC is the curve of maximum incremental anal squeeze pressure versus duration of the anamnesis of perianal disease lesions. AUC = 0.596 ± 0.043 (95% CI: 0.51–0.7); p = 0.02, cut-off point to more than 5.5 years. Sensitivity = 89.3% (95% CI 82.6–96.6%). Specificity = 24.6% (95% CI 15.9–35.9%)*

the curve is 0.596 ($p$ = 0.02). The duration of a history of perianal manifestations of more than 5.5 years increases the likelihood of a decrease in maximum pressure in the anal canal with voluntary contraction (OR = 2.74; 95% CI: 1.24–6.06, $p$ = 0.012) (Fig.3).

## DISCUSSION

The prevalence of anal incontinence in CD patients ranges from 25% to 75% [6]. There is a significant decrease in the quality of life of patients experiencing difficulties with continence more than once a week [9]. In this regard, it is extremely important to identify the risk factors of AI, which will help to develop an adequate algorithm for the treatment of patients. This study did not reveal a significant effect of any of the evaluated parameters on the phenomena of clinical AI. At the same time, according to the results of the univariate analysis of the risk factors for anal incontinence identified by sphincterometry, it was found that the presence of a history of surgery for PFCD increases the chance of developing AI (OR = 4.1; 95% CI: 1.27– 13.2; $p$ = 0.02). The number of previous operations did not matter. In those studies where anorectal manometry was performed, similar results were obtained and the association of decreased sphincter function was confirmed not only with the presence of a history of surgeries, but also with their number [6, 10]. In turn, parameters such as the form of Crohn's disease and its activity according to ultrasound and colonoscopy, taking steroids, the presence of a stoma, the number and degree of complexity of fistulas did not affect anal incontinence phenomena according to both Wexner's scale and the results of anorectal manometry. At the same time, some authors have demonstrated the existence of a connection between AI phenomena and CD activity [10, 11]. It is important to note that in this study, AI was more likely to be registered due to a decrease in the mean pressure in the anal canal at rest (APACr) — 90% of cases. In the studies by de Codes, L. et al., as well as Kangas, E. et al., similar results were described [5,10]. As a result of the analysis of risk factors associated with a decrease in the value of maximum pressure in the anal canal with volitional efforts (MP ACv), a significant effect of the duration of the history of perianal fistular disease in CD was revealed. Thus, the risk of a decrease in the studied indicator increased with a chronic course of perianal fistular disease for more than 5.5 years (OR = 2.74; 95% CI: 1.24–6.06, $p$ = 0.012). The revealed factor is probably due to pronounced cicatricial and inflammatory changes in perifistular tissues, including sphincter in the case of transsphincteric and extrasphincteric fistulous tracks. It was found that the presence of more than 2 fistula-related abscesses in a patient is also significantly associated with a high risk of reducing MP ACv (OR = 2.36; 95% CI: 1.39–4.31, $p$ = 0.005). This fact confirms the above assumption about the negative effect of perifistular changes on the retentionfunction, especially in the presence of pronounced chronic inflammation caused by long-existing purulent cavities and fistula-related abscesses, both in the immediate vicinity of the anal sphincter and in the pararectal tissue. Thus, the identified risk factors for AI indicate the need for surgical treatment of perianal

fistular disease as soon as possible after diagnosis. Proctitis has not demonstrated an effect on continence, which may indicate that this factor is not an absolute contraindication to surgical treatment; however, in such a situation, a two-stage treatment strategy for anal fistulas should be followed, including in order to reduce the risk of AI progression. The use of seton ensures adequate drainage of fistula-related abscesses, which are a predictor of anal incontinence [12]. The results of the study should be treated with caution due to a number of limitations: the retrospective nature of the data analysis and their incomplete description; the inclusion of patients with stoma in the study; significant differences in the nature of previous procedures for perianal fistular disease and the anti-recurrence therapy received.

## CONCLUSION

The analysis of predictors of anal incontinence in patients with perianal fistular disease Crohn's disease will make it possible to develop an optimal treatment strategy for this category of patients; therefore, this problem needs further study.

**AUTHOR CONTRIBUTIONS**

Study conception and design: *Ivan S. Anosov, Alexandr Yu. Titov*

Data collection and processing: *Ivan S. Anosov, Tatyana A. Eryshova, Roman Yu. Khryukin, Oksana Yu. Fomenko, Evgeniy S. Harlamochkin*

Statistic alanalysis: *Roman Yu. Khryukin*

Writing: *Tatyana A. Eryshova, Ivan S. Anosov, Roman Yu. Khryukin*

Editing: *Alexandr Yu. Titov*

**INFORMATION ABOUT THE AUTHORS (ORCID)**

Ivan S. Anosov — 0000-0002-9015-2600

Tatyana A. Eryshova — 0009-0004-6076-5192

Roman Yu. Khryukin — 0000-0003-0556-1782

Oksana Yu. Fomenko — 0000-0001-9603-6988, Scopus Author ID: *16401538300*

Evgeniy S. Harlamochkin — 0009-0001-3941-8442

Alexandr Yu. Titov — 0000-0002-1636-8075

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