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LUSSY score predictive of failure of surgical closure of obstetric rectovaginal fistula in the Democratic Republic of the Congo

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Abstract

Introduction Rectovaginal fistula (RVF) is a complex debilitating condition that results from several etiologies, obstetric trauma being the most common. Occasionally RVF closure is non-successful. The objective of this study is to develop a predictive score to identify predictors of failure of surgical closure of obstetric RVF (FSCORVF) in the Democratic Republic of the Congo.

Methods This was an analytical cross-sectional study conducted on 268 patients with obstetric RVF who have received surgical management. We proceeded with a bivariate and then multivariate analysis. Score discrimination was assessed using the ROC curve and C-index and score calibration was done according to the Hosmer–Lemeshow test.

Results Surgical closure of RVF failed in 12.31% of cases (33/268). After logistic modelling, five criteria emerged as predictive factors of FSCORVF (LUSSY Score): the presence of moderate/severe fibrosis (aOR: 36.25; 95% CI: 1.88–699.37), combined RVF with other type of fistula (aOR: 61.41; 95% CI: 8.78–429.72), fistula size > 3 cm (aOR: 82.45; 95% CI: 10.48–648.58), per-operative hemorrhage (aOR: 27.84;; 95% CI: 5.08–152.47) and postoperative infection (aOR: 1161.35; 95% CI: 46.89–28765.47). A score of 0 to 22 was obtained with a value ≤ 9 points indicating a low risk of FSCORVF, a value between 10 and 12 defining a moderate risk and the value ≥ 13 points corresponding to a high risk of FSCORVF. The area under the ROC curve of the score is 0.9744 with a sensitivity of 90.91%, a specificity of 97.87%, a positive predictive value of 85.71% and a negative predictive value of 98.71%.

Conclusion This study identified predictive factors for FSCORVF in the DRC, grouped in the LUSSY score. Complex fistulas (fistula size > 3 cm, severe fibrosis, combined fistulas) require advanced surgical routes different from the transvaginal and the transperineal ones used in the present study. Prevention of intraoperative hemorrhage and postoperative infections requires rigorous preparation, appropriate antibiotic prophylaxis, and strict postoperative follow-up.

Keywords Obstetric rectovaginal fistula, Failure of surgical closure, LUSSY score

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Introduction

Rectovaginal fistula (RVF) is a medical condition that is characterized by abnormal communication between the rectum and vagina, resulting in bothersome symptoms such as uncontrolled passage of gas and/or feces through the vagina. Patients who have this type of fistula may also have dyschezia, dyspareunia, localized pain, especially in the initial phase due to tissue inflammation or a feeling of pelvic or perineal heaviness [1, 2].

RVFs can result from a variety of causes, including obstetric trauma, inflammatory bowel diseases such as Crohn's disease, pelvic surgery, infections (Bartholin's gland abscesses), or radiation for the treatment of pelvic cancers [3–9]. Obstetric trauma is the leading cause of obstetric rectovaginal fistulas (ORVFs) in developing countries where access to emergency obstetric and neonatal care is severely restricted [10]. As with vesicovaginal fistulas (VVF), RVF is usually related to prolonged obstructed labor, which occurs primarily when the fetal head becomes stuck in the maternal pelvis, disrupting blood flow to surrounding tissues. Prolonged obstruction can cause tissue deterioration due to lack of blood supply, leading to fistula formation [11]. RVFs are less common than VVFs and this is explained by the fact that the rectum is relatively more protected than the bladder to undergo the consequences of compression secondary to prolonged labor because it is stretcher and empties more easily than the bladder. But also, the curve of the sacrum offers better protection against necrosis due to pressure than the symphysis pubis offers for the bladder and urethra [11]. The incidence of ORVF is estimated to range from 0.2 to 4 per 1000 deliveries and the prevalence from 0 to 81 per 1000 women [12].

Complications of RVF include fecal incontinence with associated hygiene problems, vaginal, perineal or anal irritation, life-threatening abscess and recurrence of the fistula [13]. It can also cause emotional distress and physical discomfort, affecting self-esteem and intimacy [2].

Different surgical approaches such as endorectal, transvaginal or trans-perineal closures of the fistulous tract have been widely described in the literature for the closure of RVFs. Some teams use local advancement flaps such as Martius flap and gracilis muscle interposition, primarily in cases of recurrence, to improve the surgical closure outcomes [14–16]. Although surgical closure is usually effective, it can sometimes fail, requiring additional interventions.

Failure of surgical closure of ORVF (FSCORVF) can have significant consequences for patients. Not only do the initial symptoms persist, but patients may also suffer additional complications, such as recurrent infections. In addition, FSCORVF can have a significant psychological impact, affecting the patient's quality of life [2].

To our knowledge, little not saying no literature has been published on predictors of FSCORVF. Most publications focus on the outcomes of RVF's surgery from all causes [17–20] or only those of RVFs from Crohn's disease [21, 22].

The present study was conducted with the aim of identifying the predictive factors of FSCORVF in the Democratic Republic of the Congo (DRC) in order to develop a predictive score of FSCORVF tailored to our setting. Identifying risk factors for FSCORVF in patients undergoing surgical closure can help improve the quality of patient care and the overall outcome of fistula closure in the DRC.

Methods

Study design and period

This was an analytical cross-sectional study conducted from January 2017 to December 2022 in general referral hospitals in seven provinces of the DRC: HEAL Africa Hospital and General Referral Hospital (GRH) of Beni (North Kivu province), GRH of Wamba (Haut-Uélé province), GRH of Lukonga (Kasai Central province), GRH Dr Amu-Yasa-Bonga (Kwilu province), GRH of Kipaka and GRH of Kasongo (Maniema province), GRH of Karawa (North Ubangi province) and GRH of Katako-Kombe (Sankuru province).

Study population and data collection

Patients were recruited during 18 surgical camps organized by the non-governmental organization HEAL Africa in collaboration with the National Ministry of Public Health of the DRC. The camps aimed at providing access to free of charge specialized fistula care. A total of 268 patients with ORVF were enrolled and were treated by the same surgical team.

Preparation to surgery took 4 days for each patient (light diet for 3 days then liquid diet for 1 day). Two days before surgery, patients were subjected to morning and evening intestinal enema. Transvaginal or transperineal surgical approaches were used for fistula closure. After surgery, post-operative follow-up took 7 consecutive days. Antibiotics and analgesics were given. Bladder catheter was kept for 48 h after surgery.

Success or failure of closure was determined during post-operative follow up. Observational approach was used and consisted of a daily monitoring for any flatus or feces passage from the vagina for the 7 post-operative days of recovery. At discharge, a gentle vaginal examination was done using a sims speculum to check for eventual presence of feces in the vagina. In case of doubt, a dye test was performed to rule out any failure of the fistula closure. Passage of gas and feces from the anus and absence of feces in the vagina meant successful closure.

The contrary meant failure of closure. Whether the fistula was closed or not, patients were allowed home. Those with failed closure were given an appointment for the next camp.

Study variables

We collected sociodemographic characteristics of patients, which included age at surgical closure (in years), residence (rural or urban), educational level (none, primary, or secondary), parity at surgical closure (1 or ≥ 2), place of delivery at fistula onset (home or health facility). We also looked at the use of intravaginal indigenous products by patients as part of traditional fistula treatment. Clinical features variables for fistula included: fistula age (< 1 year, 1–5 years, or > 5 years), number of ORVFs in the same patient (1 or ≥ 2), fistula size (≤ 3 cm or > 3 cm), combination of ORVF with another type of fistula in the same patient (yes or no), the presence of fibrosis (mild or moderate/severe), and the number of previous attempts of surgical closure (none or ≥ 1). Also recorded was the outcome of surgical closure (failure or success) and patients were divided into two groups based on the outcome of surgical fistula closure.

Operational definitions

Success of surgical closure was defined as the total closure of the fistulous tract, with or without fecal or gas incontinence. This meant there was no leakage of stools or passage of gas at the fistula site.

Failure of surgical closure was defined as the non-closure, partial or total, of the fistulous tract. This meant the fistula was not closed even if the leakage of stools or passage of gas had decreased considerably with preserved or non-preserved passage of stools/gas through the anus.

Fibrosis corresponded to the presence of scar/rigid tissue around the fistulous tract. It was assessed by the surgeon and was classified into mild, moderate and severe. Mild fibrosis referred to presence of sufficient soft tissues, easy to mobilize. Moderate fibrosis corresponded to the presence of rigid tissue around the fistula that could allow mild mobilization. Severe fibrosis referred to the presence of rigid tissues with difficult/impossible mobilization.

Use of indigenous or traditional products referred to all herbal products that patients had used vaginally to treat the fistula prior to surgical closure.

Intraoperative hemorrhage meant any bleeding exceeding 300 ml from the fistula site during the surgical closure procedure.

LUSSY score is the name we gave to the score we developed to predict failure of surgical closure of ORVF.

Data analysis

The statistical analyses were carried out using the STATA 16 software. Data from patients with FSCORVF were compared with those whose surgical closure was successful. These analyses focused on the different explanatory variables (independent variables) one by one to look for a possibly significant association with the FSCORVF (dependent variable). The association between an explanatory variable and the FSCORVF was measured by calculating odds ratios (OR) and their 95% confidence intervals (95% CIs). Pearson's Chi-square test was used to compare the observed proportions. Statistical significance was set at $p < 0.05$. All variables with significance less than 0.2 in the unifactorial analysis were included in a multivariate logistic regression analysis. For the construction of the multivariate model, we opted for the stepwise selection method at a significant level of $p < 0.05$. The logistic model thus allowed the analysis of the contribution of each explanatory variable to the FSCORVF in the presence of the other independent variables and not the participation of the explanatory variables taken alone. The discrimination of the logistic model was assessed by calculating the area under the ROC (Receiving Operating Characteristics) curve. The graphical expression of score discrimination was done by the ROC curve, which is the plot of sensitivity values as a function of the specificity complement (1– specificity). The calibration of the score was done by the Hosmer–Lemeshow test. Score discrimination is its ability to differentiate between subjects who have the disease and those who do not. We then determined the sensitivity, specificity and percentage of cases correctly classified against statistic. The evaluation of the robustness of the model coefficients was done by bootstrap [23, 24]. A predictive risk score was derived at the end of the statistical analysis. In order to develop a screening tool to predict the FSCORVF, we assigned points to each risk factor selected in the logistic model. To make it simple and usable, the score was estimated using the rounded values of these coefficients [24]. The risk probabilities of the FSCORVF based on the values of the constructed score were also calculated.

Results

A total of 268 patients with ORVF underwent surgical closure and failure rate was 12.31% of cases (33 out of 268).

Table 1 presents sociodemographic characteristics and obstetric history associated with FSCORVF (N = 268). Age 20–29 years showed a higher OR for failure (OR = 2.17), although this was not statistically significant (p = 0.3879). No significant differences were observed regarding place of residence (p = 1.0000), level

Table 1 Sociodemographic characteristics and obstetric history in correlation with failure of surgical closure in patients with obstetric rectovaginal fistula in the Democratic Republic of the Congo (N = 268)

Variable	Result of surgical closure of obstetric rectovaginal fistula				Total (N = 268)	Crude odds ratio [95% confidence interval]	p-value
	Failed (n = 33)		Success (n = 235)				
Age at closure							
< 20 years	3	7.50%	37	92.50%	40	1.00	
20–29 years	13	14.94%	74	85.06%	87	2.17 [0.54–12.51]	0.3879
30–39 years	7	11.48%	54	88.52%	61	1.60 [0.33–10.15]	0.7359
≥ 40 years	10	12.50%	70	87.50%	80	1.76 [0.41–10.52]	0.5402
Residence							
Rural	27	12.62%	187	87.38%	214	1.15 [0.45–2.95]	1.0000
Urban	6	11.11%	48	88.89%	54	1.00	
Educational level							
None	14	10.77%	116	89.23%	130	1.00	
Primary	11	11.46%	85	88.54%	96	1.07 [0.46–2.48]	1.0000
Secondary	8	19.05%	34	80.95%	42	1.94 [0.75–5.04]	0.2581
Place of delivery							
Home	17	12.23%	122	87.77%	139	0.98 [0.47–2.04]	1.0000
Health facility	16	12.40%	113	87.60%	129	1.00	
Parity at closure							
1	21	12.65%	145	87.35%	166	1.00	
≥ 2	12	11.76%	90	88.24%	102	0.92 [0.43–1.96]	0.9818
Use of intravaginal indigenous products							
No	8	5.44%	139	94.56%	147	1.00	
Yes	25	20.66%	96	79.34%	121	4.52 [1.96–10.45]	0.0003

of education ($p > 0.05$) or place of delivery ($p = 1.0000$). Parity showed a lower odds ratio for failure in patients with ≥ 2 children ($p = 0.9818$). However, the use of intravaginal indigenous products was significantly associated with an increased risk of failure of closure (OR = 4.52, $p = 0.0003$), highlighting this factor as a critical risk.

Table 2 highlights key clinical features associated with FSCORVF. Fistula age and previous closure attempts were not significantly linked to surgical failure ($p > 0.05$). However, significant associations were found between FSCORVF and factors such as the number of fistulas, ORVF combined with another fistula type, moderate/severe fibrosis, fistula size > 3 cm, and postoperative complications, including bleeding and infection ($p < 0.001$).

Table 3 presents the adjusted odds ratios (aOR), 95% confidence intervals (95% CIs), regression coefficients, p-values, and risk scores for the clinical variables associated with the FSCORVF. Multiple logistic regression identifies five criteria as predictors of FSCORVF (Table 3): presence of moderate/severe fibrosis (aOR: 36.25; 95% CI: 1.88–699.37; $p = 0.017$), combination of ORVF with another type of fistula in the same patient (aOR: 61.41; 95% CI: 8.78–429.72; $p < 0.0001$), fistula size > 3 cm (aOR: 82.45; 95% CI: 10.48–648.58; $p < 0.0001$), per-operative bleeding (aOR: 27.84; 95% CI: 5.08–152.47; $p < 0.0001$), and post-operative infection (aOR: 1161.35; 95% CI: 46.89–28,765.47; $p < 0.0001$).

The predictive score of FSCORVF was constructed from the logistic model. Each risk factor was weighted by a regression coefficient representing the weight of the variable in the score calculation, with all scores obtained illustrated below (Table 3).

The presence of these five criteria corresponds to a certain number of points for a total of 22 points. For each patient, the score ranges from 0 to 22 and the higher it is, the higher the risk of FSCORVF.

The risk probabilities of FSCORVF based on constructed score values have been calculated and are presented in Table 4. A score ≤ 9 points defines a group of patients at low risk of FSCORVF, a score between 10 and 12 points defines a moderate risk of FSCORVF, and a score ≥ 13 points define a high risk of FSCORVF. This is the LUSSY score.

Thus, for this LUSSY score predictive of FSCORVF, a sensitivity of 90.91% was obtained for a specificity of

Table 2 Clinical features in correlation with failure of surgical closure in patients with obstetric rectovaginal fistula in the Democratic Republic of the Congo (N = 268)

Variable	Result of surgical closure of obstetric rectovaginal fistula				Total (N = 268)	Crude odds ratio [95% confidence interval]	p-value
	Failed (n = 33)		Success (n = 235)				
Age of fistula at closure							
< 1 year	5	9.43%	48	90.57%	53	1.00	
1–5 years	9	11.54%	69	88.46%	78	1.25 [0.39–3.97]	0.9247
> 5 years	19	13.87%	118	86.13%	137	1.55 [0.55–4.37]	0.5607
Previous attempts of surgical closure							
No	18	12.00%	132	88.00%	150	1.00	
≥ 1	15	12.71%	103	87.29%	118	1.07 [0.51–2.22]	1.0000
Number of ORVF in the same patient							
1	9	4.89%	175	95.11%	184	1.00	
≥ 2	24	28.57%	60	71.43%	84	7.78 [3.42–17.67]	< 0.0001
Combination of ORVF with other types of fistulas in the same patient							
No	13	6.74%	180	93.26%	193	1.00	
Yes	20	26.67%	55	73.33%	75	5.04 [2.35–10.77]	< 0.0001
Presence of fibrosis							
Mild	1	0.81%	123	99.19%	124	1.00	
Moderate/severe	32	22.22%	112	77.78%	144	34.85 [5.63–1442.23]	< 0.0001
Post-operative complications							
No	10	4.39%	218	95.61%	228	1.00	
Per-operative haemorrhage	6	27.27%	16	72.73%	22	8.17 [2.63–25.36]	0.0002
Post-operative infection	17	94.44%	1	5.56%	18	340.91 [45.80–5541.47]	< 0.0001
Fistula size							
≤ 3 cm	8	3.94%	195	96.06%	203	1.00	
> 3 cm	25	38.46%	40	61.54%	65	15.23 [6.41–36.21]	< 0.0001

ORVF obstetric rectovaginal fistula

Table 3 Multivariate analysis of risk factors for FSCORVF and corresponding LUSSY score

Variable	Adjusted odds ratio	95% confidence interval	Coefficient	p-value	Score
Moderate/severe fibrosis	36.25	1.88–699.37	3.59	0.0174	4
Fistula size > 3 cm	82.45	10.48–648.58	4.41	< 0.0001	4
Combination of ORVF with another type of fistula	61.41	8.78–429.72	4.12	< 0.0001	4
Post-operative infection	1161.35	46.89–28,765.47	7.06	< 0.0001	7
Per-operative hemorrhage	27.84	5.08–152.47	3.33	0.0001	3

97.87%. The positive predictive value was 85.71% and the negative predictive value was 98.71%.

The area under the ROC curve (AUC) of the score is 0.9744 (Fig. 1). This curve shows excellent discrimination with respect to its ability to discriminate between patients who will have FSCORVF and those who will not.

Discussion

In our study, the overall success rate of surgical closure for ORVFs was 87.7%, with a failure rate of 12.3%. We found that FSCORVF was significantly associated with several factors, including moderate/severe fibrosis, fistula size greater than 3 cm, the presence of additional fistulas in the same patient, perioperative bleeding, and

Table 4 Probability of FSCORVF by score according to logistic regression model

Score obtained	Probability of failure* (%)
0	0.00
1	0.00
2	0.01
3	0.04
4	0.12
5	0.31
6	0.82
7	2.15
8	5.49
9	13.35
10	28.99
11	51.96
12	74.13
13	88.36
14	95.26
15	98.16
16	99.30
17	99.73
18	99.90
19	99.96
20	99.98
21	99.99
22	99.99

*obtained from the formula: $p = 1/1 + \exp(-10.64 - 0.9744 \times \text{score})$

post-operative infection. While the success rate of ORVF closure is generally high, often exceeding 90% in various settings [25], these outcomes can be influenced by factors such as the size and location of the fistula, the patient's medical history, surgical expertise, and postoperative care. In comparison to other studies, Pinto et al. [28] reported a lower success rate of 66.7% in a series of 36 RVFs. One possible reason for this discrepancy could be differences in the patient population, such as the presence of more complex or advanced fistulas, which could make surgical closure more challenging. Additionally, variations in surgical techniques, healthcare infrastructure, and postoperative care between different settings may also contribute to the observed differences in outcomes. In contrast, Baraket et al. [26] achieved a success rate of 90.3%, while Browning and Whiteside [27] reported a remarkable 98.4%. These findings suggest that factors such as surgical expertise, patient selection, and postoperative care protocols may significantly influence the success of RVF closure. These differences underscore the importance of context-specific evaluation when assessing surgical outcomes.

Success rates for obstetric fistula closure vary depending on surgical expertise, patient factors, and postoperative care [29, 30]. WHO guidelines stress that skilled surgery is key to achieving success rates above 85% in well-equipped settings [31, 32]. Our study aims to develop a predictive score for the DRC, helping identify high-risk patients for surgical failure. WHO advocates for context-specific approaches, recognizing regional differences in healthcare, surgical expertise, and patient demographics [33]. Our findings align with this, highlighting the importance of skilled surgery, perioperative care, and long-term follow-up for better RVF closure outcomes. WHO emphasizes continuous quality improvement and capacity-building to improve global surgical results [34].

In our study, we found that fistula size > 3 cm and the combination of multiple fistulas in the same patient were associated with higher rates of FSCORVF. Previous studies also identified large size (> 3 cm) and multiple fistulas (> 2) as risk factors for surgical failure [30, 35, 36]. Larger and multiple fistulas complicate tissue mobilization, preventing tension-free closures and increasing the risk of dehiscence. This strain on sutures, combined with tissue loss, may reopen the communication between the rectum and vagina, necessitating tissue grafts [25, 35]. Additionally, these factors impact local vascularization, essential for wound healing. Insufficient blood supply can lead to tissue ischemia, necrosis, infection, and wound dehiscence [37]. The proximity of the rectal and vaginal walls, with minimal tissue between them, makes RVF closures particularly challenging. Successful closure requires removing unhealthy tissue and replacing it with well-vascularized tissue to ensure proper healing. A robust interposing tissue layer between the rectum and vagina is crucial for reducing failure risk and improving surgical outcomes [38].

Our study found a strong association between moderate/severe fibrosis and higher rates of FSCORVF. This has been corroborated by several studies that highlight the independent effect of fibrosis on fistula closure [30, 39–41]. Fibrosis, which results from inflammation and abnormal tissue healing after necrosis, complicates surgical closure. It makes tissues less flexible and harder to mobilize, leading to greater tissue damage during the procedure. Fibrotic tissues can also form contracted scar tissue, which impedes proper fistula closure, increasing the risk of recurrence [30, 35]. Additionally, fibrotic tissues often have poor vascularization, hindering healing and making the tissues more prone to infections. In our study, 45.1% of patients reported using indigenous products for fistula treatment, which may have contributed to the formation of fibrosed tissue [42]. Managing fibrosis during RVF closure is crucial to improving outcomes.

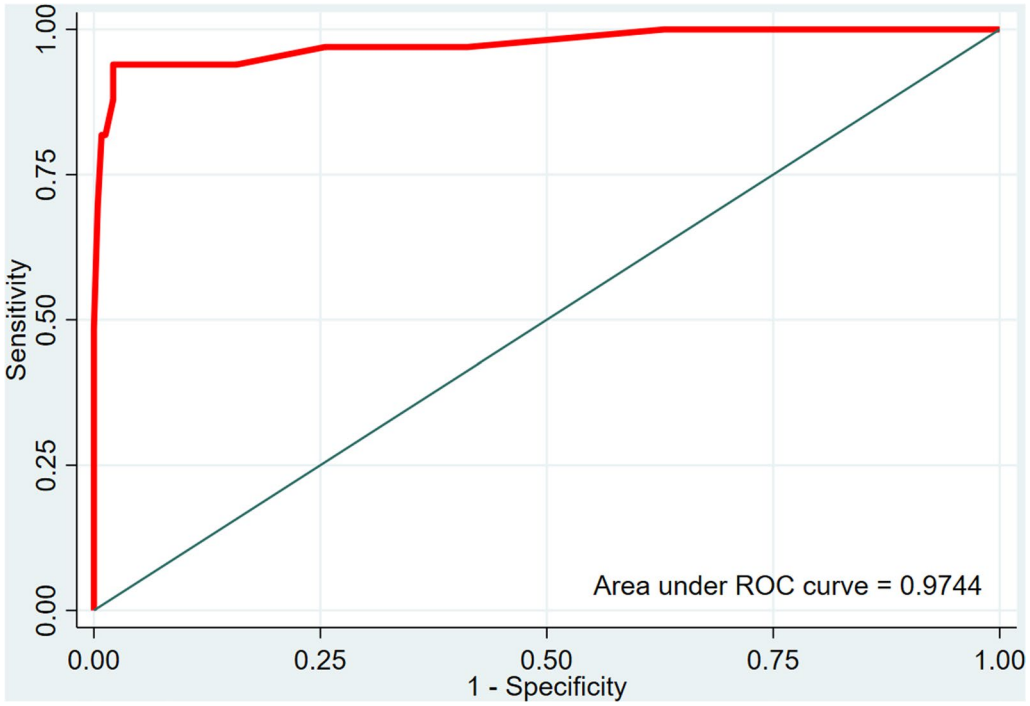

Fig. 1 ROC curve of the FSCORVF predictive score

Surgeons should identify fibrotic tissue early and consider excising or carefully handling these areas to avoid complications. Also, addressing poor vascularization through tissue grafts or careful surgical techniques could promote better healing and reduce the risk of recurrence. Additionally, the use of indigenous products by patients should be considered, as these may affect tissue healing and contribute to fibrosis as outlined by Paluku et al. [42].

Our study found that per-operative bleeding significantly impacts ORVF closure. While bleeding itself is a concern, not all cases require transfusion. However, significant bleeding often necessitates transfusion to maintain hemodynamic stability and oxygen delivery. A recent Ugandan study by Holt et al. [43] found that patients who required perioperative transfusions had a higher rate of FSCORVF. This suggests that the need for transfusion could signal more severe complications, such as extensive tissue damage or poor surgical technique, both linked to higher failure rates. Surgeons must manage bleeding carefully during RVF closure to minimize complications. Significant bleeding can impair tissue visibility, delay surgery, and increase the risk of infections, hematomas, and fistula recurrence [44]. Strategies to reduce bleeding, such as meticulous dissection and early identification of bleeding vessels, can improve surgical outcomes. Additionally, the need for transfusion should prompt careful evaluation of surgical technique and tissue handling.

Postoperative infections increase the risk of FSCORVF. Frontali et al. [18] highlighted that perineal infections significantly raise the likelihood of failure, suggesting that antibiotics could be beneficial in preventing infections. Infections delay tissue healing, prolong inflammation, and disrupt recovery by weakening sutures and tissues [37, 45]. This can compromise closure integrity and increase the need for repeat surgeries [46]. Additionally, infections may lead to complications like abscesses, requiring further medical intervention and complicating the initial treatment. Surgeons must focus on preventing postoperative infections through appropriate antibiotic use and infection control measures. Prompt recognition and treatment of infections are essential to avoid complications such as abscesses and suture failure. Furthermore, addressing the emotional impact of infections on patients, which can affect their confidence and adherence to post-surgery care, is crucial for improving outcomes [2]. Maintaining a supportive environment and providing clear post-surgery instructions can enhance patient recovery and prevent setbacks.

This study developed the LUSSY score, a tool to predict the risk of FSCORVF. Our results showed that clinical characteristics, such as moderate/severe fibrosis, multiple fistulas, fistula size > 3 cm, intraoperative hemorrhage, and postoperative infection, were significantly associated with FSCORVF. The LUSSY score, based on these factors, demonstrated a sensitivity of 90.91% and a specificity of 97.87%, making it effective for screening at-risk patients before surgery. This is the first study to create such a scoring system in the DRC, providing a practical tool

to assist clinicians in predicting surgical outcomes. The LUSSY score can guide surgical decisions, helping clinicians identify patients at higher risk of surgical failure. Incorporating this tool into preoperative assessments allows for better-informed decisions regarding patient management. It's important to note that the first surgical attempt typically has the best chance of success, emphasizing the need for careful planning and management from the outset to improve closure outcomes.

This study has several strengths. It includes an acceptable sample size given the rarity of RVF as an anatomoclinical and pathological entity and provides a comprehensive analysis of various variables for each patient treated. Patients were recruited from multiple sites across the DRC, ensuring sample diversity, and all were treated under similar conditions, which enhances the generalizability of the findings. Additionally, the development of the LUSSY score offers a valuable tool for predicting surgical outcomes in ORVF closure.

However, the study also has limitations. It did not explore the long-term outcomes of patients several months after discharge, which would have provided a more comprehensive picture of the durability of the surgical closure. Moreover, the observed variability in the data suggests the need for further research on obstetric RVFs to better understand and potentially mitigate this variability, thereby strengthening the robustness and predictive power of the model. It is also important to note that, as a cross-sectional study, it does not allow for the establishment of causal relationships between risk factors and surgical outcomes. Finally, external validation of the LUSSY score in other clinical and geographical contexts is needed to confirm its reliability and applicability on a broader scale.

Despite these limitations, the LUSSY score can still serve as a useful tool in preoperative assessment for patients at risk of FSCORVF, assisting clinicians in making informed surgical decisions. However, future studies should address these gaps to refine the model and improve its application in different clinical settings.

Conclusion

The ORVF closure rate in the DRC is 87.7%, surpassing the WHO's 85% threshold for successful outcomes in well-equipped settings. This promising result highlights progress despite challenges in surgical infrastructure and patient demographics.

This study identified predictive factors for FSCORVF, grouped in the LUSSY score. Key factors include fistula size, fibrosis, combined fistulas, and perioperative risks like hemorrhage and infection. Complex fistulas (> 3 cm, severe fibrosis, combined fistulas) require advanced surgical approaches beyond the transvaginal and transperineal techniques used. Preventing intraoperative hemorrhage and postoperative infections necessitates rigorous preparation, antibiotic prophylaxis, and strict follow-up.

With improved surgical expertise, perioperative care, and infrastructure, ORVF treatment outcomes in the DRC could further improve. While our results are encouraging, continued efforts are needed to address surgical outcome determinants and validate predictive models like the LUSSY score. Future studies should refine these models to enhance ORVF care success rates in the DRC and similar contexts.

Abbreviations

aOR	Ajusted odds ratio
AUC	Area under the ROC CURVE
95%CI	95%Confidence interval
DRC	Democratic Republic of the Congo
FSCORVF	Failure of Surgical Closure of Obstetric Recto-Vaginal Fistula
GRH	General Referral Hospital
ORVF	Obstetric recto-vaginal fistula
OR	Odds ratio
RVF	Recto-vaginal fistula
ROC	Receive operating characteristics
VVF	Vesico-vaginal fistula

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Author contributions

J.L.P, O.M, C.W.M, and J.S.J were the principal investigators, conceived and designed the survey and critically reviewed the manuscript. J.L.P, F.K.S, C.M.F and E.M.K collected data. J.L.P, F.K.S, Z.K.T, S.O.W, C.W.M and J.S.J reviewed the manuscript development, revised the methodology and critically reviewed the manuscript. All authors reviewed and approved the final manuscript.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study obtained the approval of the Medical Ethics Committee of the University of Goma (Approval No.: UNIGOM/CEM/011/2022). Informed consent was obtained from all the participants in the current study. All methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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