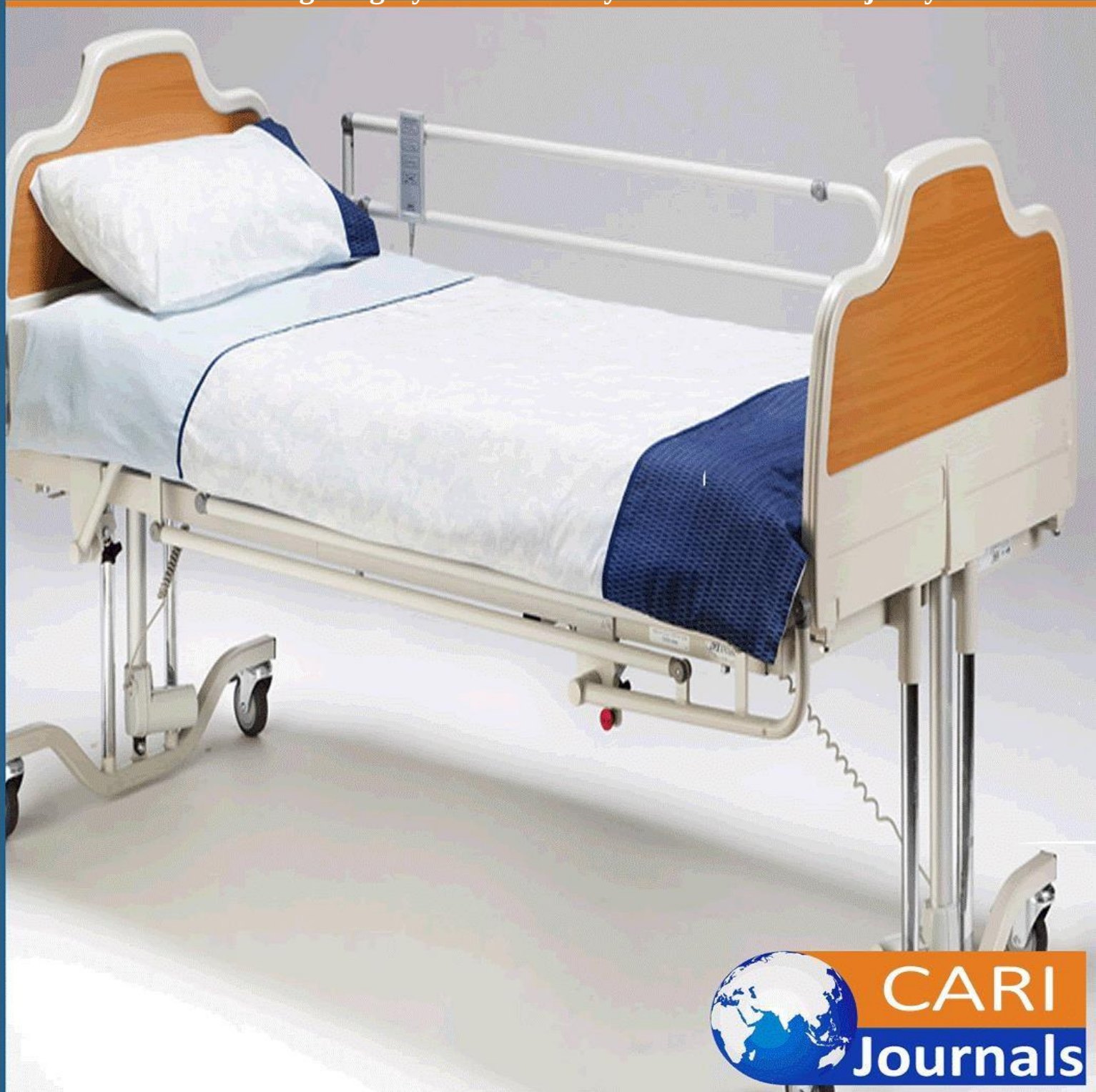
International Journal of
Health, Medicine and Nursing Practice
(IJHMNP)

Factors Associated with Postoperative Digestive Fistulas Following Surgery for Secondary Peritonitis in Mbujimayi



CARI Journals

International Journal of Health, Medicine and Nursing Practice
ISSN 2710-1150 (Online)
Vol.9, Issue No.1, pp 17 - 25, 2026
www.carijournals.org

Factors Associated with Postoperative Digestive Fistulas Following Surgery for Secondary Peritonitis in Mbujimayi

François Kabumba Kabumba[1*], Godefroid Cibangu Mubiayi[1], Trésor Kabuya Kabamba[1], Clément Kadima Mutombo[2], Joseph Ngandu Tshilunda[1], Séverin Uwonda Akinja[1]

[1]Department of Surgery, Université Officielle de Mbujimayi, Mbujimayi, DRC.

[2]Department of Gynecology and Obstetrics, Université Officielle de Mbujimayi, Mbujimayi, DRC.

https://orcid.org/0009-0000-5558-6107

Accepted: 4th Dec, 2025, Received in Revised Form: 25th Dec, 2025, Published: 5th Jan, 2026

ABSTRACT

Purpose: Postoperative digestive fistulas (POFs) are a major cause of morbidity and mortality in low-resource settings. This study aimed to identify the socio-demographic, clinical, biological, and intraoperative factors associated with the occurrence of POFs in patients operated on for secondary peritonitis in Mbujimayi.

Methodology: A cross-sectional, multicenter and analytical study was conducted over 15 months (September 2022–December 2023) in three hospitals in Mbujimayi (DRC). Sixty-seven patients operated on for secondary peritonitis were included. Socio-demographic characteristics, clinical and biological parameters, and intraoperative findings were analyzed to determine their association with postoperative digestive fistulas. Data were processed using Excel 2007 and SPSS 20. Statistical significance was set at $p \leq 0.05$.

Findings: The study population was predominantly young adults (mean age: 23 years), with a slight male predominance (61.2%). Most patients came from peri-urban areas and presented late, with 85% consulting more than 72 hours after symptom onset; among them, 43.9% developed a fistula. Hypoproteinemia (<5 g/dL) was present in 49.25% of patients and significantly increased the risk of fistula formation (OR ≈ 3). Perforations located within 20 cm of the ileocecal junction showed a tenfold increased risk. Emergency surgery accounted for 98.5% of cases. Nearly half of the fistulas occurred in patients operated on by non-specialist physicians. Primary suturing resulted in a high fistula rate (44%), whereas ileostomy appeared protective.

Unique Contribution to Theory, Practice and Policy: This study identifies key clinical, biological and surgical factors associated with postoperative digestive fistulas in a low-resource setting and highlights the need for improved nutritional assessment and surgical expertise to reduce their occurrence.

Keywords: *Postoperative Digestive Fistula, Secondary Peritonitis, Hypoproteinemia, Associated Factors*

INTRODUCTION

The management of enterocutaneous fistulas (ECFs) remains a major challenge in surgical practice, given their substantial morbidity and the complexity of their therapeutic course [1]. Optimal care requires a stepwise approach beginning with stabilization of the patient's physiological status. Electrolyte disturbances, ongoing sepsis, and malnutrition are well-established risk factors for postoperative fistula formation, particularly in patients undergoing surgery for secondary peritonitis [1].

Therefore, early identification and appropriate management of these factors are essential to improving patient outcomes. Maintaining electrolyte and fluid balance is critical and requires continuous monitoring, given the rapid onset and severity of potential disturbances. The anatomical location of the fistula and the magnitude of its output largely determine the extent of electrolyte and fluid losses [1–3].

Identifying the etiological factors involved in fistula formation is essential, as the anatomical location of the fistula provides valuable prognostic information regarding patient outcomes and the likelihood of spontaneous closure [4]. The majority of enterocutaneous fistulas are postoperative in origin and typically arise from the dehiscence of a digestive anastomosis but may also result from inadvertent intraoperative bowel injury. Several clinical and perioperative factors act both as complications that exacerbate fistula severity and as predictors of their occurrence. [5]. Surgical procedures performed for malignant tumors, inflammatory bowel disease, or extensive adhesiolysis are among the most common interventions preceding their development [5,6].

Medical conditions that impair wound healing - such as malnutrition, advanced age, and active malignancy - are recognized contributors to an increased risk of postoperative digestive fistula formation [7]. Other authors have identified additional determinants, including patient-related factors, surgeon-related factors, and characteristics of the surgical procedure itself, all of which may influence the likelihood of fistula development [8].

The occurrence of a postoperative small bowel fistula represents a major surgical concern due to its high morbidity. Its development is more frequently associated with emergency procedures, extensive viscerolysis, and operations performed for inflammatory bowel disease (such as Crohn's disease), radiation-induced injury, tumors, or ischemic lesions. Additional risk factors include anastomosis performed in a septic abdominal environment, small bowel suturing, and peri- or postoperative trauma. Other contributing elements comprise decompression or drainage enterotomies, closure of the laparotomy under tension, and postoperative evisceration [9].

The objective of this study was to identify the risk factors associated with the development of postoperative digestive fistulas in patients undergoing surgery for secondary peritonitis in Mbujimayi.

METHODS

This was a cross-sectional, multicenter and analytical study conducted in three major healthcare facilities in the city of Mbujimayi: Bonzola General Referral Hospital (HGR), Notre Dame Hospital Center, and the Mbujimayi University Clinics. These institutions were selected because they are the best equipped, have the highest patient volumes, and employ qualified surgical staff.

The study covered a period of one year and three months, from September 2022 to December 2023, and included a sample of 67 patients treated for secondary peritonitis. A non-probability convenience sampling method was used.

All patients who were followed and operated on for secondary peritonitis and who had complete medical records were included in the study. Patients whose records lacked sufficient information for analysis were excluded.

The following variables were assessed to determine their association with the occurrence of postoperative digestive fistulas: sex, age, place of origin, consultation delay, intervention delay, site of perforation, serum protein level, presence of fistula, and the surgical procedure performed.

Data were collected using a pre-established research protocol developed in accordance with the study objectives. Data processing was performed using Microsoft Excel 2007 and IBM SPSS version 20. The statistical parameters used included the mean, standard deviation, and Fisher's exact test. Statistical significance was defined as a p-value ≤ 0.05, with an odds ratio (OR) greater than 1 and 95% confidence intervals.

Ethics Approval Statement

Our study received approval from the ethics committee of the Official University of Mbujimayi. It was conducted in accordance with the ethical principles governing biomedical studies involving humans, as stipulated in the Declaration of Helsinki, adopted at the 75th General Assembly of the World Medical Association (WMA) in October 2024 [27].

RESULTS

1. Clinical and Biological Parameters

A total of 57 patients sought medical consultation more than 72 hours after symptom onset; among them, 25 patients (43.9%) developed a postoperative digestive fistula. Fourteen patients were malnourished, of whom 5 (35.7%) developed a fistula, while 9 (64.3%) recovered without complications.

Nearly half of the patients had low serum protein levels (< 5 g/dL). Among these, 18 patients (54.55%) developed a fistula, compared with 15 patients (45.45%) who did not. The risk of fistula formation was approximately three times higher in patients with serum protein levels below 5

g/dL. This association between hypoproteinemia and the occurrence of postoperative digestive fistulas was statistically significant.

The vast majority of patients (66 patients, 98.5%) presented as emergency cases, among whom 28 (42%) developed a postoperative digestive fistula. No significant association was found between the emergency context and fistula occurrence (Table 1).

Table 1. Clinical and biological parameters

	Postoperative Fistula			
Variables	**Yes**	**No**	**OR [IC 95%]**	**p**
Consultation delay (hour)				
> 72	25 (43.9%)	32 (56.1%)	2 [0.4-7.8]	0.50
≤ 72	3 (30.0%)	7 (70.0%)		
Type of consultation				
Emergency	28 (42.7%)	38 (56.7%)	1 [0.5-0.7]	1.00
Non-urgent	0 (0.0%)	1 (100.0%)		
Nutritional status				
Malnourished	5 (35.7%)	9 (64.3%)	0.72 [0.2-0.5]	0.60
Normal state	23 (43.4%)	30 (56.6%)		
Serum protein (g/dL)				
< 5	18 54.6%)	15 (45.5%)	3 [1.1-7.9]	0.03
≥ 5	10 (29.4%)	24 (70.6%)		

2. Surgical Data

Among the 54 patients with an ileal perforation, 22 (40.74%) developed a fistula. Notably, 21 of these 22 perforations were located less than 20 cm from the ileocecal junction, a location associated with a tenfold increased risk. This anatomical proximity showed a statistically significant association with fistula formation.

Debridement and suturing were the most frequently performed procedures (50 patients), among whom 22 (44%) developed a postoperative digestive fistula. This difference was not statistically significant. The risk of fistula formation was 2.5 times higher in patients who underwent appendectomy. In contrast, ileostomy appeared to be a protective factor, with no cases of fistula observed in patients who received this procedure (Table 3).

Among patients who developed a fistula, 18 (48.65%) had been operated on by unqualified physicians, corresponding to a twofold increased risk; however, this difference did not reach statistical significance (Table 2).

Table 2. Surgical data

Variable	Postoperative Fistula		OR [IC 95%]	p
	Yes	No		
Perforation location				
Ileum	22 (40.7%)	32 (59.3%)	0.80 [0.2-2.7]	0.72
Stomach	2 (25.0%)	6 (75.0%)	0.42 [0.1-2.3]	0.30
Appendix	2 (66.7%)	1 (33.3%)	3.0 [0.3-33.9]	0.37
Colon	2 (100.0%)	0 (0.0%)	*	0.09
Distance between perforation and the ileocolic junction (cm)				
< 20	21 (48.8%)	22 (51.2%)	9.5 [1.1-1.2]	0.01
≥ 20	1 (9.1%)	10 (90.9%)		
Operator qualification				
Others	18 (48.7%)	19 (51.35%)	1 [0.20-1.43]	0.20
Specialists	10 (33.3%)	20 (66.7%)		
Surgical procedure				
Debridement and closure	22 (44.0%)	28 (56.0%)	1.44 [0.5-4.5]	0.53
End-to-end anastomosis	2 (28.6%)	5 (71.4%)	0.52 [0.1-2.9]	0.69
Ileostomy	0 (0.0%)	12 (100.0%)	0.0	0.00
Colostomy	1 (100.0%)	0 (0.00%)	*	0.23
Appendectomy	2 (100.0%)	0 (0.0%)	2.5 [1.9-3.4]	0.09

* Not defined

DISCUSSION

1. Clinical and Biological Data

1.1. Delay and Type of consultation

In our study, a large proportion of patients sought medical attention more than 72 hours after symptom onset. This delay in consultation is consistent with observations reported in similar low-resource settings, where late presentation remains a major contributor to morbidity. Several contextual factors may explain this trend, including limited health literacy, reliance on traditional healers as a first line of care, and initial consultation in peripheral health centers with insufficient diagnostic and surgical capacity. These delays likely contributed to the severity of peritonitis at presentation and may have increased the risk of postoperative complications, including digestive fistulas.

In this study, nearly all patients presented in an emergency setting (98.5%, 66 out of 67 cases). This predominance of emergency admissions is consistent with findings from Kaimba et al. in Ndjamena, who reported that postoperative digestive fistulas occurred in emergency situations in

93.8% of cases [21]. Similarly, Mbuya et al. in Lubumbashi (Democratic Republic of Congo) identified emergency care as the primary mode of referral in 64.20% of patients [3].

These observations highlight the persistent challenge of delayed presentation and the high burden of acute abdominal emergencies in low-resource settings. Emergency surgical interventions are often performed under suboptimal conditions - hemodynamic instability, advanced peritonitis, and limited preoperative optimization - which may contribute to the increased risk of postoperative complications, including digestive fistulas.

1.2. Serum Protein Levels

In our study, nearly half of the patients (33 out of 67; 49.25%) had serum protein levels below 5 g/dL. This finding is consistent with the results reported by Nabin P. et al., who observed hypoproteinemia (<5 g/dL) in 62% of their cohort [20]. Among our patients with low serum protein levels, 18 (54.55%) developed a postoperative digestive fistula.

This association is biologically plausible, as serum proteins play a fundamental role in wound healing and overall physiological homeostasis. Adequate protein levels are essential for collagen synthesis, fibroblast proliferation, angiogenesis, and the formation of granulation tissue - all key processes in tissue repair. Protein deficiency compromises these mechanisms, thereby increasing the risk of anastomotic dehiscence and fistula formation [22,23]. Our findings therefore reinforce the importance of early nutritional assessment and optimization in patients presenting with secondary peritonitis.

2. Surgical Data

2.1. Location

In our study, perforating lesions located in the terminal ileum - specifically within 20 cm of the ileocecal junction - were associated with a tenfold increased risk of developing postoperative digestive fistulas. Several anatomical and physiological factors may explain this finding. The terminal ileum is a region subject to significant peristaltic activity, which can generate increased tension on sutures and compromise anastomotic integrity. Moreover, this transition zone between the small and large intestines contains a denser bacterial flora and exhibits greater digestive activity compared with more proximal segments of the small bowel. These characteristics may predispose to impaired healing and a higher likelihood of fistula formation in the event of perforation or surgical repair [24].

2.2. Operator Qualification

In our series, a substantial proportion of postoperative digestive fistulas occurred in patients operated on by non-specialist physicians, with 18 out of 37 cases (48.6%) recorded in this group. This trend has also been reported in other low-resource settings, where surgical procedures are frequently performed by providers with limited formal training in digestive surgery [25,26].

Several factors may explain this association. Limited surgical experience may lead to suboptimal choice of suture materials or inadequate suturing techniques, both of which can compromise tissue integrity and healing.

In addition, insufficient technical expertise may result in excessive tension on sutures, increasing the risk of local ischemia and subsequent anastomotic failure. These elements collectively contribute to a higher likelihood of postoperative complications, including digestive fistulas.

2.3. Surgical Procedure Performed

In our study, freshening of the edges of the perforated lesion followed by primary suturing was associated with a high rate of postoperative digestive fistulas, occurring in 22 out of 54 cases (44%). This complication is likely related to inadequate debridement of devitalized tissue and the presence of inflammatory edema surrounding the perforation, both of which can compromise suture integrity and predispose to dehiscence. These findings are consistent with those reported by Di Costanzo J. et al. [18], who also observed a higher incidence of fistulas when primary repair was performed under unfavorable local conditions.

CONCLUSION

Postoperative digestive fistulas (POFs) remain a major surgical concern in Mbujimayi. In this study, the principal risk factors identified were low serum protein levels and perforations located less than 20 cm from the ileocecal junction. These fistulas were most frequently observed following emergency surgical interventions, particularly those performed for secondary peritonitis due to typhoid intestinal perforation.

The perforative lesions responsible for secondary peritonitis were predominantly located in the small intestine, followed by the stomach, appendix, and cecum. These findings highlight the need for early consultation, improved preoperative optimization - especially nutritional status -and strengthened surgical expertise to reduce the incidence of postoperative digestive fistulas in this setting.

Limitations study: The main limitation of our study is its small sample size.

What is known about it: Postoperative digestive fistulas remain a major cause of morbidity and mortality, particularly in low-resource settings.

What this study contributes: It provides the first multicenter description of postoperative digestive fistulas in Mbujimayi. It identifies hypoproteinemia and ileal perforations located within 20 cm of the ileocecal junction as significant risk factors.

Conflict of Interest Declaration: The authors declare that they have no conflict of interest.

Contributions of the authors

FKK: Corresponding Author, substantial contribution to the design and configuration, and manuscript drafting. GTM and TKK: Substantial contribution to the acquisition, analysis and interpretation of the data and manuscript drafting. CKM and JNT: Substantial contribution to design and configuration, interpretation of data and supervision of the entire work. SUA: Substantial contribution to the design and configuration, data validation and supervision of the entire job. All authors: last reading and validation of the manuscript.

REFERENCES

1. Charles G, Jean-Claude M, Stanislas H, Paul B, Reverien N, Cedric N. Factors influencing postoperative digestive fistulas. Podium of Sciences. 2022;1(2):45-65.
2. Soro G, Coulibaly A, Yapo P, Koffi G, N'Daha HA, Ehua SF, et al. Prognosis of postoperative digestive fistulas at Yopougon University Hospital, Abidjan, Côte d'Ivoire. Mali Med. 2006;4:114-15.
3. Mbuya M. Postoperative external digestive fistulas: challenges of management, about 15 cases. Lubumbashi: University of Lubumbashi; Specialization Thesis.
4. Mukena BB. Postoperative external digestive fistulas: frequency, etiopathogenesis and management. Lubumbashi: University of Lubumbashi, Faculty of Medicine.
5. Ortiz LA, Zhang B, McCarthy MW, Kaafarani HM, Fagenholz P, King DR, et al. Management of enterocutaneous fistulas, past and present. Nutr Clin Pract. 2017;32(4):508-15.
6. Marochi B, Pereira DL, Lattmann LM, Mai S, Matos ANLF, Fukuchi TMK, et al. Epidemiological profile of postoperative digestive fistulas. Int Surg Clin Res. 2021;12(2):77-88
7. Ngom G, Fall I, Sankale AA, Konate I, Ndour O, Ndaye M. Digestive perforations in blunt abdominal trauma in children. Med Afr Noire. 2006;53(11):587-90.
8. Yassir EO. Postoperative digestive fistulas: about 31 cases. Rabat: Faculty of Medicine and Pharmacy; Medical Thesis. 2020.
9. Schecter WP, Hirshberg A, Chang DS. Enteric fistulas: principles of management. Am Coll Surg. 2009;209(4):484-91.
10. Fisher JE. The pathophysiology of enterocutaneous fistulas. World J Surg. 1983;7(4):446-50.
11. Musapud EM, Mukakala AK, Katambua PM, Nafatalewa DK, Yumba SN, Ntanga DI, et al. Epidemiological profile of post-laparotomy external digestive fistulas in two university hospital units in Lubumbashi. J Med Res. 2020;6(4):7-172.
12. Gandossi Y. External enterocutaneous fistulas. Digestive Surgical Intensive Care. Paris: Saint-Antoine Hospital; 2020. p.1-10.
13. Nicolas MM, Masumbuko YM. Factors associated with outcomes of enterocutaneous fistula management in university hospitals affiliated with the University of Dodoma. Int Surg Res Pract. 2023;10:160.

14. Fischer PE, Fabien TC, Magnotte LJ, Schroeppel TJ, Bee TK. A ten-year review of enterocutaneous fistulas after trauma laparotomy. J Trauma. 2009;67:924-28
15. Dimanche-Adeoye I, Eni UE, Ekwedigwe KC, Isikhuemen ME, Daniyan BC. Enterocutaneous fistula coexisting with an enterovisceral fistula: a rare complication of ovarian cystectomy. Afr J Reprod Health. 2019;23:139-49.
16. Xu X, Ma Y, Yao Z, Zhao Y. Prevalence and risk factors of pressure ulcers in patients with enterocutaneous fistula: a single-center retrospective study in China. Med Sci Monit. 2019;25:2591-98.
17. Prodromidon, Pandraklakis A. Prevention and management of surgical complications. Int J Gynecol Cancer. 2021;31:26.
18. Di Costanzo J, Canon N, Martin J, Richieri JP, Mercier R, Lafille C, et al. Treatment of external gastrointestinal fistulas with combined total parenteral nutrition and somatostatin. JPEN J Parenter Enteral Nutr. 2017;11:465-70.
19. Muhindo V, Mokonji M, Kambala K, Imoron Y. Epidemiological and therapeutic profile of digestive fistulas in Butembo, eastern DR Congo. J Soc Biol Clin Benin. 2020;34:1-6.
20. Nabin P, Gaurav K, Suboch KA. Comparison of the preoperative nutritional risk index and body mass index for predicting immediate postoperative outcomes after major gastrointestinal surgery: a cohort study. Ann Med Surg. 2019;48:53-58.
21. Kaimba BM, Seid DA, Doumtol E, Ndiaye K. Evolution of postoperative digestive fistulas after conservative treatment: about 18 cases in Ndjamena. Health Res Afr. 2023;1(4):38-42.
22. Leang YJ, Bell SW, Carine P, Chin M, Farmer. Enterocutaneous fistula: analysis of clinical outcomes from a single tertiary referral center in Victoria. ANZ J Surg. 2018;88:E30-33.
23. Tang QQ, Hong ZW, Ren HJ, Wu L, Wang GF. Nutritional management of patients with enterocutaneous fistulas: practice and progress. Front Nutr. 2020;7:564379.
24. Ashkenazi I, Turegano-Fuentes F, Olsha O, Alfici R. Treatment options for gastrointestinal cutaneous fistulas. Surg J (NY). 2017;3(1):25-31.
25. Lee JK, Stein SL. Radiologic and endoscopic diagnosis and treatment of enterocutaneous fistulas. Clin Colon Rectal Surg. 2010;23(3):149-60.
26. Tuma F, Crespi Z, Wolff CJ, Daniel DT, Nassar AK. Enterocutaneous fistula: a simplified clinical approach. Cureus. 2020;12(4):77-89.
27. World Medical Association. Declaration of Helsinki: Ethical principles for medical research involving human subjects. Adopted by the 18th WMA General Assembly, Helsinki, Finland, June 1964, and amended by the 75th WMA General Assembly, Helsinki, Finland, October 2024.