

# Clinical Epidemiology and Surgical Treatment of Spontaneous Perforations of the Terminal Ileum: A Multicentre Study in Cameroon

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## Abstract

**Background:** Perforations of the terminal ileum are a frequent clinical situation and a therapeutic challenge. Surgical treatment is controversial. Several surgical modalities have been proposed and postoperative morbidity and mortality remain high. The aim of this study was to review our experience in the surgical management of perforations of the terminal ileum. **Patients and methods:** This is a descriptive cross-sectional study with retrospective data collection from January 1, 2017 to December 31, 2021, in five hospitals in Cameroon. Patients' demographic, clinical presentation, surgical findings and 30-days postoperative outcomes data were collected. **Results:** We collected 34 files. The sex ratio was 1.4 and the average age was 20.28 years. The average consultation time was 9.1 days. Abdominal pain was present in all our patients. Peritoneal irritation was present in 46 cases (88.5%). The mean time to treatment after admission was 17.5 hours. The perforation was unique in 40 cases (76.9%) and located between 6 and 10 cm from the ileocecal valve in 29 cases (55.8%). Typhoid was the most suspected etiology intraoperatively in 38 cases (73.1%). A simple suture was performed in 18 patients (34.6%), resection with anastomosis in 11 patients (21.2%) and an ileostomy in 5 patients (9.6%). The average length of hospitalization was 21.74 days. Postoperative morbidity and mortality were 32.7% and 17.3% respectively. **Conclusion:** Perforations of the terminal ileum are common and affect young people. Surgical procedures are varied. Reducing consultation and care times and respecting treatment principles could improve postoperative morbidity and mortality, which remain high.

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## Keywords

Perforation of the Terminal Ileum, Simple Suture, Resection, Morbidity, Mortality

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## 1. Introduction

Intestinal perforation, more specifically perforation of the terminal ileum, is a major complication and a serious challenge for surgeons. When they are non-traumatic, they are most often due to typhoid fever, which is endemic in developing countries, where it is a huge public health burden [1] [2] [3]. Surgical treatment of typhoid intestinal perforation is still associated with high morbidity and mortality, even though this has been falling for some decades [4] [5]. Several potentially modifiable factors have been identified, including the interval between perforation and surgery, the quality of management and low incomes. In general, perforation of the terminal ileum is responsible for peritonitis, which is more severe the later it is treated [6] [7] [8].

The management of perforations of the terminal ileum is based on appropriate peri-operative medical treatment combined with surgical control of sepsis. However, surgical treatment remains highly controversial. Several modalities have been proposed, including simple suture, marginal or segmental resection with anastomosis, ileostomy with or without resection, directed fistulisation, temporary or permanent internal ileotransverse shunt with or without resection and right hemicolectomy [4]. The decision about which technique to use depends on the appearance of the perforation and the digestive tract, the degree of contamination of the peritoneal cavity, the patient's physiological condition, the technical resources available and the experience and habits of the surgeon [4] [9]. Early diagnosis and treatment avoid prolonged procedures and are associated with lower morbidity and mortality [10] [11]. On the other hand, resection is often recommended in cases of significant ileocolonic lesions due to late diagnosis, which is frequently responsible for severe peritonitis, sepsis, malnutrition and hydro-electrolytic disorders, leading to high morbidity and mortality [2] [6] [7] [8] [12] [13].

The aim of this study was to report our surgical experience in the management of perforations of the terminal ileum over the last 5 years.

## 2. Patients and Methods

We conducted a multicentre descriptive cross-sectional study in 5 hospitals in Cameroon: Yaoundé General Hospital, Yaoundé Central Hospital, Yaoundé Gynaecological-Obstetric and Paediatric Hospital, Douala Laquintinie Hospital and Douala Gynaecological-Obstetric and Paediatric Hospital. These are 1st and 2nd category hospitals in the national health pyramid and teaching hospitals with digestive surgery, paediatric surgery and emergency surgical units.

We examined the operative reports of the surgical emergency departments of the different hospitals to identify the patients operated on from 1st January 2017 to 31st December 2021, a 5-year period, for spontaneous perforation of the terminal ileum. Patients of both sex and of all ages were included. Unusable (incomplete or not found) files were excluded. Socio-demographic, clinical, paraclinical, therapeutic and outcome data were collected. Postoperative follow-up should be known within 30 days following surgery.

Data analysis was performed using Microsoft Office Excel 2016 and SPSS version 20.0 software. Quantitative data were expressed as means and standard deviations, and qualitative variables were reported as numbers and percentages.

### Ethical Considerations

The present study was approved by the institutional ethical clearance committee of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I under the n° 318/UYI/FMSB/VDRC/DAASR/CSD of June 6, 2022. All authorizations were obtained from the managers of the different sites selected for the study.

### 3. Results

During the study period, 61 patients underwent surgery for non-traumatic perforation of the terminal ileum. Nine files (14.8%) could not be used.

We enrolled 52 patients, 31 men (59.6%) and 21 women (40.4%), giving a sex ratio of 1.47. Their mean age was  $20.28 \pm 20.03$  years, with the extremes of 6 and 82 years. Thirty (30) patients (57.7%) were under 20 years of age. The socio-demographic characteristics of the patients are presented in **Table 1**.

Our patients were seen on average 9.1 (3 - 22) days after the onset of symptoms. In 28 cases (53.8%), patients had been referred from a lower-category health facility. Self-medication with antibiotics had been administered in 23 cases (44.2%). On admission, abdominal pain was present in all our patients. Vomiting and a cessation of bowel movements and gas were present in 44 patients (84.6%) and 37 patients (71.2%) respectively. Signs of peritoneal irritation were present in 46 cases (88.5%). **Table 1** reports the clinical profile of the study population. A plain abdominal X-ray was performed in all of our patients and revealed pneumoperitoneum in 28 cases (53.8%).

The average time of management after admission was 17.5 hours (extremes of 2 and 120 hours). Thirty-four (34) patients (65.4%) had been treated before the 12th hour after admission. All our patients underwent laparotomy. It was median in 29 patients (55.8%).

There was a single ileal perforation in 40 cases (76.9%) and in 29 cases (55.8%), perforations were located between 6 and 10 cm from the ileo-caecal junction. Typhoid was the most suspected etiology intraoperatively in 38 cases (73.1%). An excisional associated with a suture was performed in 18 patients (34.6%). In 11 cases (21.2%) cases, resection with anastomosis was performed.

**Table 1.** Clinical epidemiology of the study population.

Variables	Numbers	Percentage
<b>Sex</b>		
Men	31	59.6
Women	21	40.4
<b>Age (years)</b>		
≤20	30	57.7
]20 - 40]	14	26.9
]40 - 60]	5	9.6
>60	3	5.8
<b>Consultation delay (days)</b>		
≤7	26	50
]7 - 14]	17	32.7
]14 - 21]	8	15.4
>21	1	1.9
<b>Clinical evaluation at admission</b>		
Altered general state	49	94.2
Abdominal pain	52	100
Fever	47	90.4
Vomiting	44	84.6
Cessation of materials and gases	37	71.2
Abdominal distension	50	96.2
Peritoneal irritation signs	46	88.5

An ileostomy was performed in 5 cases (9.6%). Associated procedures included appendectomy in 15 patients (28.8%). This was systematically performed before Veillard ileocolic intubation. The operative findings and treatment modalities are reported in **Table 2**.

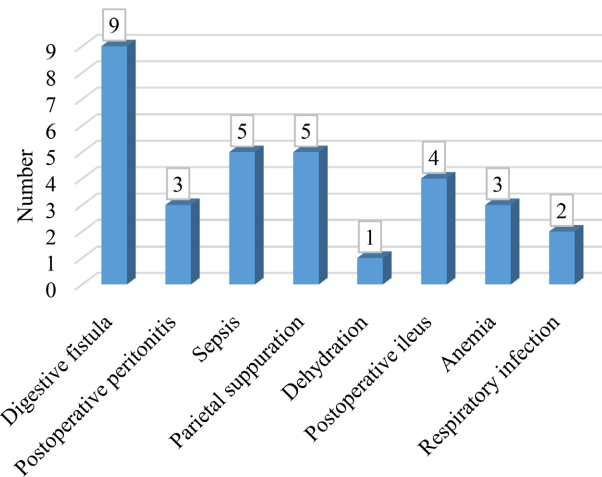
The average hospitalisation duration was  $21.74 \pm 19.14$  days, with extremes of 1 and 90 days. In the month following surgery, 32 types of complications were identified in 17 patients, giving a postoperative morbidity of 32.7% (**Figure 1**). **Figure 2** gives Clavien Dindo's classification of complications. These complications were most often septic (68.8%). Nine patients died within 30 days of surgery, giving a postoperative mortality rate of 17.3%. The causes of death were septic shock in 4 cases, postoperative peritonitis in 3 cases and high-flow fistula in 2 patients.

**Table 2.** Operative findings and therapeutic modalities.

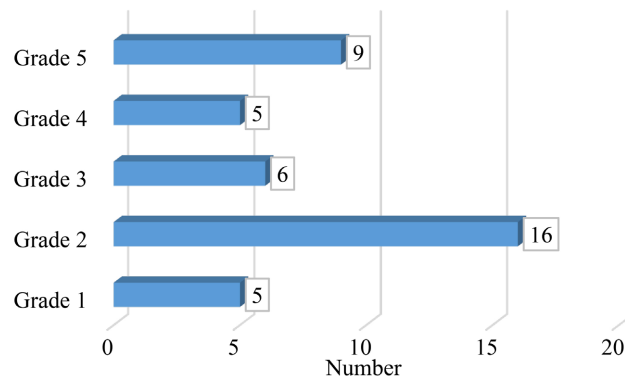
Variables	Numbers	Percentage
<b>Treatment delay after admission (hours)</b>		
≤12	34	65.4
]12 - 24]	12	23.1
]24 - 48]	5	9.6
>48	1	1.9
<b>Etiologies suspected intraoperatively</b>		
Typhoid perforation	38	73.1
Perforation in the context of obstruction	6	11.5
Perforation in a tumor context	3	5.8
Not specified	5	9.6
<b>Distance from the ileocecal valve (cm)</b>		
≤5	18	34.6
]5 - 10]	29	55.8
>10	5	9.6
<b>Number of perforations</b>		
1	40	76.9
2	7	13.5
≥3	5	9.6
<b>Surgical techniques</b>		
Excision-suture	18	34.6
Resection-anastomosis	11	21.2
Hemicolectomy	9	17.3
Veillard technique	9	17.3
Ileostomy	5	9.6
<b>Associated gestures</b>		
Appendectomy	15	28.8
Excision of a mass	3	5.8
Resection of a Meckel diverticulum	1	1.9

#### 4. Discussion

We conducted a multicentre retrospective review of the surgical management of non-traumatic perforations of the terminal ileum. These remain a major complication and a diagnostic, therapeutic and surgical challenge, especially in underdeveloped and developing countries [1] [2] [3] [14]. Perforations of the terminal ileum may mimic appendicular perforation or other pathologies such as duodenal ulcers or ileitis, which result in the delay of surgical treatment, which is often the only way to make the diagnosis.



**Figure 1.** Postoperative complications.



**Figure 2.** Clavien Dindo classification of complications.

The average age in our study was the same as in another African study [14] and higher than the average of 13.8 years reported in a series from Burkina Faso [15]. Some Asian series have found higher mean ages [2] [16] [17]. However, the young age of patients is found in most literatures [1] [2] [3] [5] [6] [9] [14]-[20]. Male predominance is consistent in the literature [1] [2] [3] [5] [6] [9] [14]-[20]. The delay in diagnosis reported in this series has been found by other authors on the continent [14] [15] [18] [20]. However, other authors have reported a shorter average duration of symptoms before admission [2] [3] [5]. This delay in diagnosis could be due to the fact that patients generally start in local centres before being transferred to a main surgical unit. This situation concerned more than half 28 patients (53.8%) in this study. Self-medication, hiding the symptoms, is also commonly found in many patients; 23 patients (44.2%) in this series. Qazi *et al.* [1] found pre-hospital self-medication in 91% of their patients. The clinical presentation was similar to that of any other acute abdomen, in particular to that observed in cases of ileal perforation as reported by other authors [1] [2] [5] [15] [17] [18] [19]. Plain abdominal radiography is of limited benefit in the diagnosis of distal ileal perforation. In fact, it only reveals a subdiaphragmatic gas stream in approximately one out of two cases, as in this study and

many others [2] [5] [15] [20]. However, other authors have reported much higher proportions, up to 96.35% [3] [19].

Laparotomy was the approach used in all our patients, as in the series by Ouedraogo *et al.* [15], although some authors suggest laparoscopy for this indication [4]. The number and distribution of perforations in the terminal ileum were similar to those reported in the literature, but the proportions vary from one study to another, and perforations are most generally isolated [9] [14] [15] [17] [18] [20]. The number of perforations varies, with up to 14 in a single patient, as reported by Nuhu *et al.* [5]. Typhoid perforation was the most suspected aetiology in this study. Typhoid fever is the main cause of spontaneous perforation of the terminal ileum in endemic areas [1] [2] [21] [22]. However, this diagnosis remains presumptive and is most often made intraoperatively [14]. The clinical presentation is that of any other acute abdomen. Serological and bacteriological data, which can be very useful, are usually negative [1] [16] [19]. Other aetiologies such as tuberculosis, tumours or non-specific causes are frequently suggested [1] [2] [16].

The surgical treatment of perforations of the terminal ileum has always been a challenge for surgeons. Various surgical procedures have been used with variable results. For many practitioners, the choice of surgical intervention depends on the patient's general condition, peritoneal contamination, inflammation of the intestine, and the location and number of perforations. The risk of new perforations and leakage of the anastomosis must therefore be taken into consideration [4] [9] [15]. Primary repair with or without marginal resection is the procedure most commonly used by many authors [2] [5] [9] [14] [15] [18] [20]. It is still indicated in cases of single perforation on a loop without extensive inflammation [9] [15] [20]. In other cases, resection is recommended, with immediate or delayed restoration of digestive continuity depending on the degree of contamination of the peritoneal cavity [2] [6] [7] [8] [9] [12] [13] [15] [20]. This approach reduces postoperative morbidity and mortality. Simple suturing has the advantage of simplicity and rapidity in patients who are often in a critical condition. However, it may be associated with higher rates of new perforations and mortality compared with those obtained after resection with anastomosis, as reported in a Nigerian study [23]. Other authors have shown the benefit of a 10 cm resection upstream and downstream of the perforated site compared with simple suturing [24]. However, this approach is problematic in cases where the perforation is very close to the ileo-caecal junction, and may require a right colectomy. However, improved supportive care, in particular parenteral nutrition, could reduce the feared risk of new perforations or leakage associated with simple closure [4]. The role of ileostomy in the treatment of perforations of the terminal ileum remains debated. It is recommended for patients with a high degree of peritoneal contamination [4] [15] [25]. Morbidity appears to be reduced with this approach, although it has the disadvantage of requiring a second operation, ostomy care and its associated costs [4].

Perforations of the terminal ileum are associated with very high post-operative morbidity and mortality [4] [5]. The complication rate recorded in this series is close to that reported by other authors [14] [16] [17]. Higher rates have also been reported [9] [15] [20]. The predominance of surgical site infections and sepsis is consistent in all series [3] [5] [9] [14] [15] [17] [18] [19] [20]. Perforations of the terminal ileum frequently lead to severe stercoral peritonitis. Added to this is the delay in diagnosis already mentioned above, which is constant in most authors on the continent [14] [15] [18] [20]. This significant morbidity is responsible for an often lengthy hospital stay, as observed in this series and in many others [5] [15] [16] [17] [20], with significant financial consequences for patients and their families. The overall postoperative mortality rate varies from 13.8% to 28.3% in African authors [5] [14] [15] [18] [20]. The mortality reported in this study falls within this range and is therefore similar to that reported in the African literature. The causes of death in patients of this study are exclusively infectious and would therefore be linked to the persistence of sepsis as reported by Saxe *et al.* [10]. Lower mortality has been reported by Indian and Turkish authors [3] [9] [17]. The explanation, according to these authors, is probably early and appropriate surgery, effective peri-operative resuscitation, intensive post-operative care, good management of the ileostomy and administration of broad-spectrum antibiotics. These management principles have been recommended by other authors [4].

## 5. Conclusion

Perforations of the terminal ileum are common in Cameroon. It is a condition affecting young people, most often of typhoid origin. Consultation times are long and surgical procedures varied, which explains the lack of consensus on surgical treatment. Post-operative morbidity and mortality remain high, although they are comparable with the literature. Reducing consultation and management times and adhering to the principles of treatment for this condition could improve these figures.

## Conflicts of Interest

No conflicts of interest.

## References

- [1] Qazi, S.H., Yousafzai, M.T., Saddal, N.S., Dehraj, I.F., Thobani, R.S., Akhtar, A., *et al.* (2020) Burden of Ileal Perforations among Surgical Patients Admitted in Tertiary Care Hospitals of Three Asian Countries: Surveillance of Enteric Fever in Asia Project (SEAP), September 2016-September 2019. *Clinical Infectious Diseases*, **71**, S232-S238. <https://doi.org/10.1093/cid/ciaa1309>
- [2] Wani, R.A., Parray, F.Q., Bhat, N.A., Wani, M.A., Bhat, T.H. and Farzana, F. (2006) Nontraumatic Terminal Ileal Perforation. *World Journal of Emergency Surgery*, **1**, Article No. 7. <https://doi.org/10.1186/1749-7922-1-7>
- [3] Babu, R.G., Malolan, A. and Chowdary, P.B. (2016) Ileostomy for Non-Traumatic



- Ileal Perforations: Is This the Beginning of the End? *Journal of Clinical and Diagnostic Research*, **10**, 23-26. <https://doi.org/10.7860/JCDR/2016/18461.7473>
- [4] Ukwenya, A.Y., Ahmed, A. and Garba, E.S. (2011) Progress in Management of Typhoid Perforation. *Annals of African Medicine*, **10**, 259-265. <https://doi.org/10.4103/1596-3519.87040>
- [5] Nuhu, A., Dahwa, S. and Hamza, A. (2010) Operative Management of Typhoid Ileal Perforation in Children. *African Journal of Paediatric Surgery*, **7**, 9-13. <https://doi.org/10.4103/0189-6725.59351>
- [6] Santillana, M. (1991) Surgical Complications of Typhoid Fever: Enteric Perforation. *World Journal of Surgery*, **15**, 170-175. <https://doi.org/10.1007/BF01659050>
- [7] Akgun, Y., Bac, B., Boylu, S., Aban, N. and Tacyildiz, I. (1995) Typhoid Enteric Perforation. *British Journal of Surgery*, **82**, 1512-1515. <https://doi.org/10.1002/bjs.1800821120>
- [8] Abantanga, F.A. and Wiafe-Addai, B.B. (1998) Postoperative Complications after Surgery for Typhoid Perforation in Children in Ghana. *Pediatric Surgery International*, **14**, 55-58. <https://doi.org/10.1007/s003830050435>
- [9] Pujar, K.A., Ashok, C.A., Rudresh, H.K., Srikantaiah, H.C., Girish, K.S. and Suhas, K.R. (2013) Mortality in Typhoid Intestinal Perforation—A Declining Trend. *Journal of Clinical and Diagnostic Research*, **7**, 1946-1948.
- [10] Saxe, J.M. and Cropsey, R. (2005) Is Operative Management Effective in Treatment of Perforated Typhoid? *The American Journal of Surgery*, **189**, 342-344. <https://doi.org/10.1016/j.amjsurg.2004.11.032>
- [11] Adeniran, J.O., Taiwo, J.O. and Abdur-Rahman, L.O. (2005) Salmonella Intestinal Perforation: (27 Perforations in One Patient, 14 Perforations in Another). Are the Goal Posts Changing? *Journal of Indian Association of Pediatric Surgeons*, **10**, 248-251. <https://doi.org/10.4103/0971-9261.19275>
- [12] Edino, S.T., Yakubu, A.A., Mohammed, A.Z. and Abubakar, I.S. (2007) Prognostic Factors in Typhoid Ileal Perforation: A Prospective Study of 53 Cases. *Journal of the National Medical Association*, **99**, 1042-1045.
- [13] Ajao, O.G. (1982) Typhoid Perforation: Factors Affecting Mortality & Morbidity. *International Surgery*, **67**, 317-319.
- [14] Kambire, J.L., Ouedraogo, S., Ouedraogo, S., Ouangre, E. and Traore, S.S. (2017) Résultats de la prise en charge des perforations iléales typhiques: À propos de 29 cas à Ouahigouya (Burkina Faso). *Bulletin de la Société de Pathologie Exotique*, **110**, 298-299. <https://doi.org/10.1007/s13149-017-0579-5>
- [15] Ouedraogo, S., Ouangre, E. and Zida, M. (2017) Profils épidémiologiques, cliniques et thérapeutiques des perforations iléales d'origine typhique en milieu rural burkinabé. *Médecine et Santé Tropicales*, **27**, 67-70. <https://doi.org/10.1684/mst.2017.0661>
- [16] Njarekkattuvalappil, S.K., Thomas, M., Kapil, A., Saigal, K., Ray, P., Anandan, S., et al. (2021) Ileal Perforation and Enteric Fever: Implications for Burden of Disease Estimation. *The Journal of Infectious Diseases*, **224**, S522-S528. <https://doi.org/10.1093/infdis/jiab258>
- [17] Gedik, E., Girgin, S., Taçyildiz, I.H. and Akgün, Y. (2008) Risk Factors Affecting Morbidity in Typhoid Enteric Perforation. *Langenbeck's Archives of Surgery*, **393**, 973-977. <https://doi.org/10.1007/s00423-007-0244-8>
- [18] Ugochukwu, A.I., Amu, O.C. and Nzegwu, M.A. (2013) Ileal Perforation Due to Typhoid Fever—Review of Operative Management and Outcome in an Urban Cen-

- tre in Nigeria. *International Journal of Surgery*, **11**, 218-222. <https://doi.org/10.1016/j.ijso.2013.01.014>
- [19] Husain, M., Khan, R.N., Rehmani, B. and Haris, H. (2011) Omental Patch Technique for the Ileal Perforation Secondary to Typhoid Fever. *Saudi Journal of Gastroenterology*, **17**, 208-211. <https://doi.org/10.4103/1319-3767.80386>
- [20] Olgemoeller, F., Waluza, J.J., Zeka, D., Gauld, J.S., Diggle, P.J., Read, J.M., et al. (2020) Intestinal Perforations Associated with a High Mortality and Frequent Complications during an Epidemic of Multidrug-Resistant Typhoid Fever in Blantyre, Malawi. *Clinical Infectious Diseases*, **71**, S96-S101. <https://doi.org/10.1093/cid/ciaa405>
- [21] Poornima, R., Venkatesh, K.L., Goutham, M.V. and Hassan, N. (2017) Clinicopathological Study of Ileal Perforation: Study in Tertiary Center. *International Surgery Journal*, **4**, 543-549. <https://doi.org/10.18203/2349-2902.isj20164796>
- [22] Khalid, S., Burhanulhuq and Bhatti, A.A. (2014) Non-Traumatic Spontaneous Ileal Perforation: Experience with 125 Cases. *Journal of Ayub Medical College, Abbottabad*, **26**, 526-529.
- [23] Ameh, E.A., Dogo, P.M., Attah, M.M. and Nmadu, P.T. (1997) Comparison of Three Operations for Typhoid Perforation. *British Journal of Surgery*, **84**, 558-559. <https://doi.org/10.1046/j.1365-2168.1997.t01-1-02494.x>
- [24] Athie, C.G., Guizar, C.B., Alcantara, A.V., Alcaraz, G.H. and Montalvo, E.J. (1998) Twenty-Five Years of Experience in the Surgical Treatment of Perforation of Ileum by *Salmonella typhi* at the General Hospital of Mexico City, Mexico. *Surgery*, **123**, 632-636. [https://doi.org/10.1016/S0039-6060\(98\)70201-6](https://doi.org/10.1016/S0039-6060(98)70201-6)
- [25] Atamanalp, S.S., Aydinli, B., Ozturk, G., Oren, D., Basoglu, M. and Yilirgan, M.I. (2007) Typhoid Intestinal Perforations: Twenty-Six Year Experience. *World Journal of Surgery*, **31**, 1883-1888. <https://doi.org/10.1007/s00268-007-9141-0>