



**Original article**

**Digestive Surgical Abdominal Emergencies: Epidemiological, Diagnostic, Therapeutic and Prognostic Aspects at the Hôpital Principal de Dakar**

Les urgences chirurgicales abdominales digestives : aspects épidémiologiques, diagnostiques, thérapeutiques et pronostiques à l'hôpital principal de Dakar

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**Résumé**

**Introduction :** L'objectif de notre travail était d'analyser les aspects épidémiologiques, diagnostiques et thérapeutiques des urgences abdominales digestives ainsi que les facteurs associés aux complications post opératoires.

**Méthodologie :** Il s'agit d'une étude transversale rétrospective à visée descriptive et analytique sur une période d'un an (1 Août 2022 – 31 juillet 2023). Tous les patients âgés de plus de 15 ans présentant une urgence abdominale digestive ont été inclus.

**Résultats :** Nous avons colligé 272 patients. L'âge moyen était de 39 ans ( $\pm 17,3$ ) et le sex ratio de 2. Le délai moyen de consultation était de 120 heures  $\pm 447,7$  (5 jours). La pathologie appendiculaire (44,5%), la péritonite aiguë généralisée (17,3%) et l'occlusion intestinale aiguë (16,2 %) étaient les pathologies les plus notées. Le traitement chirurgical était pratiqué

dans 86% des cas et la laparotomie médiane était la voie d'abord la plus utilisée (92%). La durée d'attente moyenne pour la chirurgie était de  $45,0 \pm 112,3$  heures (2 jours). Un traitement médical a été appliqué chez 11,4% et un traitement instrumental était indiqué chez 2,57 % des patients. La morbidité opératoire était de 19,6% (n=46) et l'infection du site opératoire était la principale complication post opératoire (n=23). La mortalité globale était de 2,7% (n=7). Les facteurs liés à la survenue de complications étaient l'état général OMS (p = 0,004), le taux d'hémoglobine (p = 0,015), les occlusions intestinales aiguës (p = 0,049) et la péritonite aiguë généralisée (p = 0,030).

**Conclusion :** Les urgences chirurgicales digestives posent un problème de santé publique avec une morbidité et une mortalité importantes, à cause des délais diagnostiques et thérapeutiques. Cette étude devrait permettre d'améliorer la qualité des soins et

les suites opératoires.

Mots-clés : urgence digestive, épidémiologie, facteurs pronostiques, Sénégal.

## Abstract

**Introduction:** The aim of our study was to analyze the epidemiological, diagnostic, and therapeutic aspects of digestive abdominal emergencies, as well as the factors associated with postoperative complications.

**Methodology:** This was a retrospective cross-sectional study with descriptive and analytical aims, conducted over a one-year period (August 1, 2022 – July 31, 2023). All patients over 15 years of age presenting with a digestive abdominal emergency were included.

**Results:** We collected data from 272 patients. The mean age was 39 years ( $\pm 17.3$ ), and the male-to-female ratio was 2:1. The mean time to consultation was 120 hours  $\pm 447.7$  (5 days). Appendiceal pathology (44.5%), generalized acute peritonitis (17.3%), and acute intestinal obstruction (16.2%) were the most frequently observed pathologies. Surgical treatment was performed in 86% of cases, with midline laparotomy being the most frequently used approach (92%). The mean waiting time for surgery was 45.0  $\pm 112.3$  hours (2 days). Medical treatment was administered to 11.4% of patients, and instrumental treatment was indicated in 2.57%. The operative morbidity rate was 19.6% (n=46), and surgical site infection was the main postoperative complication (n=23). The overall mortality rate was 2.7% (n=7). Factors associated with the occurrence of complications were WHO performance status (p = 0.004), hemoglobin level (p = 0.015), acute bowel obstruction (p = 0.049), and generalized acute peritonitis (p = 0.030).

**Conclusion:** Digestive surgical emergencies pose a public health problem with significant morbidity and mortality due to diagnostic and therapeutic delays. This study should help improve the quality of care and postoperative outcomes.

**Keywords:** digestive emergency, epidemiology, prognostic factors, Senegal.

## Introduction

Surgical acute abdomens (SA) were conceptualized by Mondor as “abdominal conditions which, for the most part, for lack of surgical intervention obtained without delay, cause patients to succumb in a few hours or days” [1]. Nowadays, the dogma of systematic surgical intervention has evolved rather towards medical and/or surgical strategies, but the severity and prognosis remain the same in the absence of or delay in treatment. Thus, the World Health Organization (WHO) defines SA as abdominal pain evolving for a few hours or days (less than three) that are related to a surgical pathology requiring emergency treatment [2]. They represent 5 to 10% of urgent hospital admissions [3, 4]. There is great diversity in the causes of SA, including digestive and extra-digestive etiologies. Among these SA, digestive surgical abdominal emergencies (DSAE) represent at least 80% of cases [3]. These are at the heart of surgical activity due to their frequency but also because of the prognosis. Morbidity and mortality are multiplied by a factor of 3 and 4 respectively compared to scheduled surgery [5]. Mondor’s and WHO’s definitions remind us of the imperative for accurate and early diagnosis, and the need for treatment as soon as possible; the only guarantees of a favorable outcome. Thus, the main objective was to analyze our management of DSAE through these epidemiological, diagnostic, and therapeutic aspects. The secondary objective was to identify the factors associated with the occurrence of complications.

## Methodology

This was a retrospective cross-sectional study with descriptive and analytical aims conducted over a one-year period (August 1, 2022 – July 31, 2023). We included adult patients (aged over 15 years) presenting with a digestive surgical abdominal emergency, traumatic or non-traumatic, who received surgical, medical, or instrumental treatment. Urological, gynecological-obstetrical, and proctological

pathologies were not included.

Data were collected using a self-administered online survey form via the ONA data kit, free software available online for data collection and analysis.

The variables studied included:

- age, sex;
- consultation delay, mode of admission;
- American Society of Anesthesiologist (ASA) score;
- vital signs: blood pressure, temperature, heart rate, respiratory rate, state of consciousness;
- biology: hemoglobin level, hematocrit, white blood cells, creatinine, kalemia, natremia;
- final diagnosis, duration of surgical intervention, and length of hospitalization;
- complications were assessed according to the Dindo-Clavien classification;
- factors for the occurrence of postoperative complications were also studied.

Bivariate and multivariate logistic regression was performed to identify risk factors for postoperative complications. For qualitative variables, the statistical tests used included the Pearson Chi-square test or, when the conditions for its application were not met, Fisher's exact test. For quantitative variables, Student's t-test or Mann-Whitney test were applied depending on data distribution. The odds ratio was used to retain predictive factors for complications if the value was greater than or equal to 1. A p-value less than 0.05 was retained as the significance threshold. All statistical analyses were performed using R Studio software, version 2024.04.0.

## Results

### *Epidemiological Data*

We included 272 patients presenting with a digestive surgical emergency. This represented 28% of all our hospitalization activity during this period (272/974). The mean age of included patients was 39 years  $\pm$  17.3. The most represented age group was between 20 and 39 years. The sex ratio was 2.1 (185 men for 87 women).

### *Consultation Delay and Mode of Admission*

The mean consultation delay of patients was 120 hours  $\pm$  447.7 (5 days). Regarding means of transport to the hospital, 2.6% of patients (n=7) were transported by ambulance and 2.2% (n=6) by firefighters. For the majority of patients, 95.2% (n=259), information regarding the means of transport was unavailable.

### *ASA Score*

An ASA score of 1 (no comorbidity) was noted in 87.50% (n=238) of patients.

### *Vital Signs*

Fever (temperature greater than or equal to 37.5°C) was present in 25 patients (9.2%). Shock (systolic blood pressure below 90 mmHg and diastolic blood pressure below 65 mmHg) was noted in 2.2% of patients (n = 6).

### *Biology*

Anemia (hemoglobin level below 12 g/dL) was observed in 72 patients (26.5%), leukocytosis (white blood cell count above 10,000 elements/mm<sup>3</sup>) in 127 patients (46.7%), and leukopenia (white blood cell count below 4,000 elements/mm<sup>3</sup>) in 12 patients (4.4%). Kidney failure (creatinine above 14 mg/L) was noted in 9 patients (3.3%). Electrolyte disorders (kalemia not between 3.5 and 5.5 mmol/L; natremia not between 136 and 145 mmol/L) were found in 77 patients (28.3%). Hyperkalemia (kalemia above 5.5 mmol/L) concerned 2.2% of patients (n = 6) and hypokalemia (kalemia below 3.5 mmol/L) concerned 11.8% of patients (n = 32). Hypernatremia (natremia above 145 mmol/L) concerned 1.5% of patients (n = 4) and hyponatremia (natremia below 136 mmol/L) was noted in 12.9% of patients (n = 35).

### *Imaging*

Medical imaging was performed in 252 patients (92.6%). CT scan was the most performed examination in 163 patients (47.1%). It was performed alone in 48.2% of cases (n = 131).

### *Pathologies*

Appendiceal pathologies and peritonitis were the main conditions noted, with respective frequencies of 44.5% (n = 121) and 17.3% (n = 47) (Table I).

In appendiceal pathology, simple acute appendicitis

(Figure 1) was noted in 64% of patients (78/121), followed by appendiceal abscesses in 17% of cases. Ulcer perforation was the most frequent etiology of peritonitis in 47% of cases (22/47) (Figure 2). Adhesive bowel obstruction was the main etiology of acute intestinal obstruction (61.4%), followed by pelvic colon volvulus in 15.9% of cases (Figure 3). Abdominal trauma mainly concerned abdominal wounds in 58% of cases (n= 14) (Figure 4). Abdominal contusions were noted in 42% (n= 10) of abdominal trauma cases.

**Treatment**

**Surgical Treatment**

It was performed in 234 patients (86%). Laparotomy (midline or elective) was the main approach in 92% (n=215/234) of operated patients. The mean waiting time for surgery was 45.0 ± 112.3 hours (2 days).

**Medical Treatment**

Patients who received this treatment numbered 31 (11.4%). Adhesive bowel obstruction without signs of severity was the main indication (n= 13) (Table II). The 2 non-penetrating abdominal wounds that did not require surgical exploration but suturing under local anesthesia were taken into account as a non-operative strategy.

**Instrumental Treatment**

It was indicated in 2.57% of patients (n= 7). It mainly

involved detorsion by Faucher catheter for 3 pelvic colon volvulus cases.

**Morbidity**

The overall operative morbidity was 19.6% (n=46). Clavien-Dindo classification grade 1 was noted in 65.2% of cases (n=30). The main postoperative complication was surgical site infection (SSI), noted in 23 patients, i.e., 9.8% of operated patients (Table III). In our study, nine patients had an intensive care stay, i.e., 3.3%. The mean length of hospitalization there was 4.2 ± 3.0 days.

**Mean Length of Hospitalization**

The mean length of hospitalization for all patients was 7.1 ± 5.9 days.

**Mortality**

The overall mortality was 2.7% (n=7). The causes of death were determined in 3 patients, all following septic shock.

**Prognostic Factors for Complications**

Logistic regression showed the prognostic factors related to the occurrence of complications: WHO performance status 2 (p= 0.004), hemoglobin level (a decrease in hemoglobin level at admission of 1 g/dL from normal leads to a 19% increase in complication risk), acute intestinal obstructions (p=0.049), generalized acute peritonitis (p=0.03) (Table IV).

Table I: Distribution of patients according to diagnosis (n=272)

Pathologies	n	Percentage (%)
Appendiceal pathology	121	44.5
Acute peritonitis	47	17.3
Acute intestinal obstruction (AIO)	44	16.2
Strangulated abdominal wall hernia	26	9.5
Abdominal trauma	24	8.8
Other pathologies	10	3.7
Cholecystolithiasis (5), Hepatic abscess (1)		
Acute mesenteric ischemia without distress (1)		
Pseudocyst of pancreas (1), IBD/cecal inflammation (1)		
Stenosing antro-pyloric tumor (1)		
Total	272	100

Table II: Distribution according to medical treatment (n=31)

Pathologies	Treatment	n
Adhesive bowel obstruction	Nasogastric tube	13
Contusion	Non-operative treatment	6
Non-penetrating abdominal wound	Non-operative treatment	2
Appendiceal phlegmon	Antibiotic therapy	2
Colon tumor	Symptomatic treatment	2
Fecaloma obstruction	Manual disimpaction + laxative	1
Pelviperitonitis	Antibiotic therapy	1
Perforated diverticulitis	Antibiotic therapy	1
Acute mesenteric ischemia	Heparin therapy	1
Acute lithiasic cholecystitis	Antibiotic therapy	1
Stenosing antro-pyloric tumor	NGT + analgesic	1
Total		31

Table III: Distribution of morbidity according to the Clavien-Dindo classification (n=46)

Grades	Conditions	n (46)	Percentage (%)
Grade I	Superficial SSI	23	65.2
	Urethral trauma	1	
	Chest pain	1	
	Fever	1	
	Acute urinary retention	2	
	Postoperative ileus	1	
	Median wound bleeding	1	
Grade II	Decompensated heart failure	1	13
	Anemia	1	
	Anemia + HTN	1	
	TACFA	1	
	Hypokalemia	1	
Grade IIIa	Adhesive bowel obstruction	1	2.2
	Digestive fistula	1	
Grade IIIb	Postoperative peritonitis	2	17.4
	Textiloma	1	
	Evisceration	2	
	Intraperitoneal abscess	1	
	Organ/space SSI	1	
	Early adhesive obstruction	1	
Grade IV	Septic shock	1	2.2
Total		46	100

Table IV: Analytical study of factors associated with morbidity

	crude OR (95%CI)	crude P value	adj. OR (95%CI)	adj. P value
Hemoglobin level (g/dL)	0.81 (0.7, 0.95)	0.008	0.81 (0.68, 0.96)	0.015
AIO: Yes vs No	1.86 (0.83, 4.15)	0.129	2.74 (1, 7.49)	0.049
GAP: Yes vs No	2.42 (1.15, 5.09)	0.02	2.77 (1.1, 6.97)	0.03

**WHO Performance Status:**

0- Good	Ref		Ref	
1- Fair	1.11 (0.55, 2.24)	0.763	0.7 (0.3, 1.61)	0.397
2- Poor	7.9 (2.32, 26.85)	< 0.001	7.28 (1.86, 28.46)	0.004
3- Altered	11.28 (0.99, 129.14)	0.051	5.7 (0.42, 77.16)	0.19

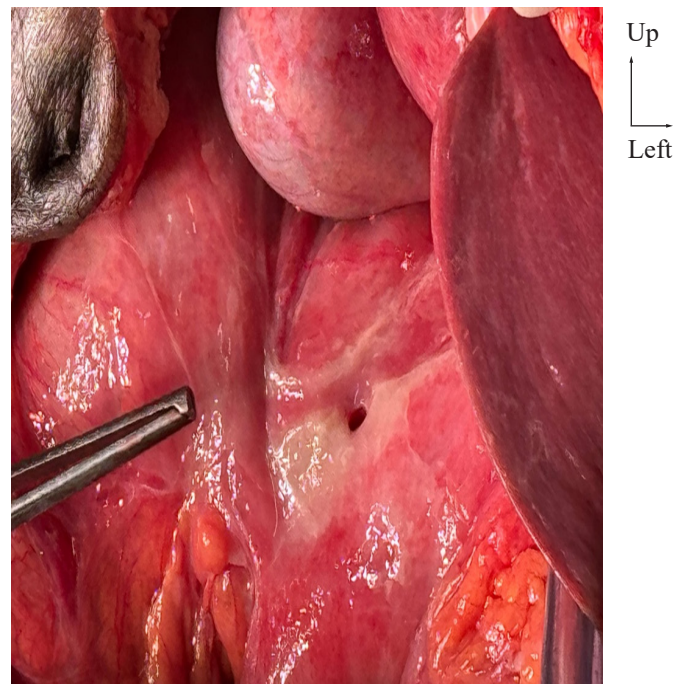


Figure 1: Operative image of acute phlegmonous appendicitis extracted through a McBurney incision (image Dr M. Faye).

Figure 2: Operative image showing a perforated duodenal ulcer (image Dr M. Faye).

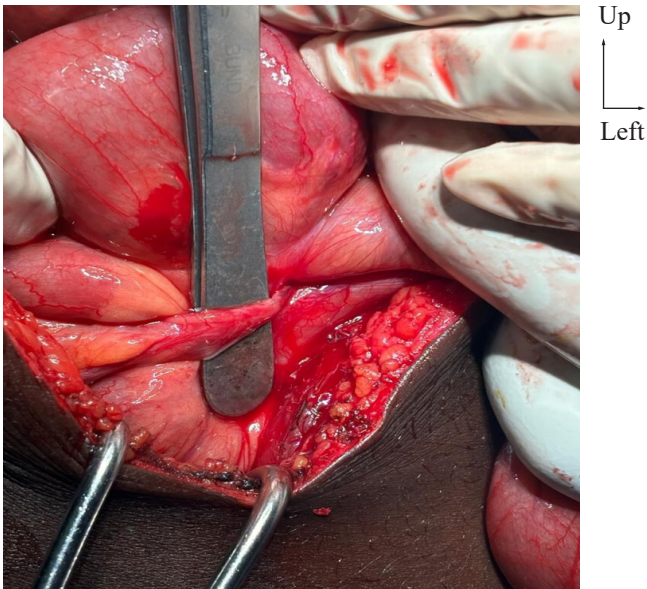


Figure 3: Peroperative image showing adhesive bowel obstruction with mesenteric band (image Dr M. Faye).

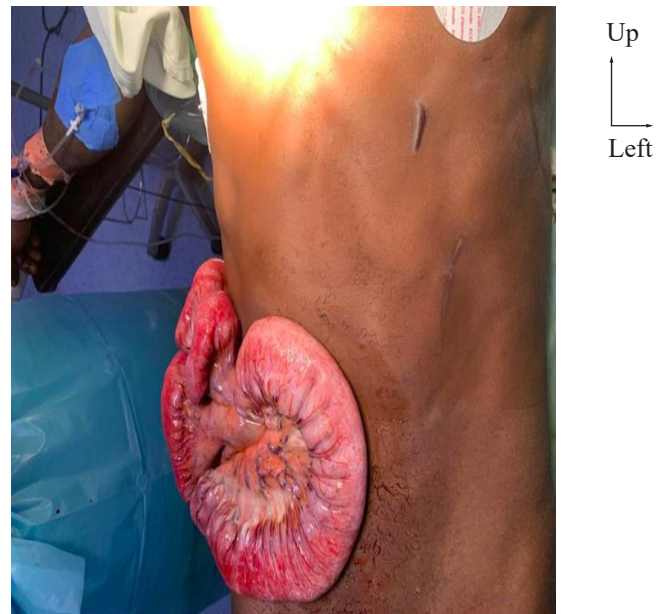


Figure 4: Peroperative image showing evisceration by sharp weapon (Photo Dr M. Faye).

## Discussion

### *Limitations*

Our study had as its main limitation the retrospective monocentric character with significant data loss. This explains the large variations observed in the analysis of certain quantitative variables, and the lack of knowledge of emergency transport means in 95% of cases.

### *Epidemiological Aspects*

DSAE represented 28% of our hospital activity. Similar frequencies have been reported in other studies conducted in Senegal [6,7]. Some authors state that this is the main activity of the digestive surgeon in Africa [8,9,10]. The majority age group in our study was between 20 and 39 years, with a mean age of 39 years. These results are comparable to those reported by Ndong et al. at the Regional Hospital of Saint-Louis (Senegal) [6].

Furthermore, a clear male predominance was observed in our study, with 68% men versus 32% women, giving a male-to-female sex ratio of 2. This prevalence of men and young people is a characteristic frequently reported in African series [11, 12, 13, 14, 15].

### *Mean Consultation Delay*

The mean consultation delay in our study was 5 days, demonstrating significant diagnostic delay; which can “cause patients to succumb in a few hours or days” according to Mondor. Similar late consultations have been reported in several African series, notably by Coulibaly et al. [16] (Mali) and Camara et al. [17] (Guinea), who respectively found mean delays of 4.8 days and 4 days after the onset of first symptoms. This situation can be explained by several factors, including the frequently observed wait-and-see attitude in our regions, often linked to a low socioeconomic level.

### *Diagnostic Aspects*

Appendiceal pathology represented the main cause of digestive surgical emergencies in our series, with a rate of 44.5%. These results are comparable to those reported by Soumah [18] and Ndong [6] in Senegal, as well as by Coulibaly [16] in Mali, who respectively observed frequencies of 65.9%, 25.1%, and 35%. A similar trend is observed in Western countries, where the prevalence of acute appendicitis is estimated at 7% [19].

However, in several other African studies, appendicitis occupies second or third place, after peritonitis and

acute intestinal obstruction [9, 15, 20]. This can be explained by prolonged management delays, which favor the natural evolution of acute appendicitis towards serious complications such as peritonitis. Acute peritonitis represented the second cause of digestive surgical emergencies in our study, with a frequency of 17.3%. Camara [17] in Mali and Soumah in Senegal [18] reported similar results with prevalences of 22% and 14%. However, Kambiré [14] (Burkina Faso) and Julie [21] (Brazzaville Congo) reported results showing a predominance of peritonitis, ahead of strangulated hernias and appendicitis. This variation could be explained by a different classification of appendicular peritonitis, often included in peritonitis etiologies rather than in appendicitis. Gastroduodenal ulcer perforation constituted the main etiology of acute peritonitis, found in 47% of patients. However, Dembélé et al. [12] (Mali) and Malik et al. [22] (Pakistan) noted typhoid ileal perforation as the main cause of peritonitis.

Acute intestinal obstructions represented the third cause of abdominal surgical emergencies in our study (16.2%). This frequency is similar to those reported by Ahmed et al. [23] in Egypt (13.4%) and Coulibaly et al. [16] in Mali (15%), where intestinal obstructions also occupied third place among abdominal emergencies. Adhesive bowel obstruction constitutes the most noted etiology in the African context [14, 22], where the frequency of laparotomies increases the risk of postoperative adhesion formation.

Strangulated hernias were ranked 4th in our series (9.6%). However, higher frequencies were observed in the studies of Kambiré [14] in Burkina and Ndong [6] in Saint Louis, Senegal, where strangulated hernias occupied 2nd place among digestive emergencies. This difference seems more contextual than real.

Traumatic surgical emergencies were less frequent in our study (8.8%). This frequency was similar to those found in various series in the African literature [17, 21, 23].

### **Treatment**

Therapeutically, we note the near absence of laparoscopy in emergency settings for organizational

and logistical reasons. Furthermore, the surgical management of DSAE is well codified with known techniques. It should also be emphasized that medical and instrumental treatment occupied an important place, having been indicated in 13.9% (n=38) of our patients. The management of DSAE is therefore multidisciplinary, and final therapeutic decisions are adapted after discussion during the emergency staff meeting. The long mean waiting time (2 days) for surgery is explained by the overwhelming influx at surgical emergencies and the availability of only one on-call team. This delay is harmful for DSAE, as reported by Adamu et al. in Nigeria [24].

### **Morbidity**

An overall morbidity of 19.9% was observed, a non-negligible rate. This result is comparable to those of Soumah et al. [18] (Senegal), who reported postoperative morbidity of 18.2%, and Katwere et al. [25] (Benin), with 17.97%. Complications in our cohort were assessed according to the Clavien-Dindo classification and mainly concerned surgical site infections (SSI) observed in 9.8% of operated patients. The high frequency of SSI in African contexts can be explained by several factors, including diagnostic delay which favors microbial proliferation, insufficient compliance with asepsis and antisepsis rules in the operative setting, the prevalence of peritonitis, as well as factors related to the patient's condition and altered general status.

### **Prognostic Factors for Complications**

Bivariate and multivariate analyses showed poor general condition, intestinal obstruction, peritonitis, and hemoglobin level as the main factors influencing morbidity in our study. Gelebo et al. [26], in Ethiopia and Fowler et al. [27] in England in their respective series also established a link between anemia and the occurrence of postoperative complications (increased risk of intraoperative transfusion, prolonged ICU admission, and SSI). In Senegal, Ndong [6] and Tendeng [9] associated mortality with delayed management. Similar results were found in several series in the African literature [14, 11, 24, 27]. They are explained by patients' financial constraints and

the non-permanent availability of the operating room. These data raise the question of social coverage in our countries and the improvement of peripheral health structures.

## Conclusion

Digestive surgical abdominal emergency is a daily concern in terms of diagnosis, management, and prognosis. In our study, it is the domain of young adult males, and its diagnosis is often clinical with the support of imaging.

Appendiceal pathology is the most frequent, and non-operative treatment occupies an important place. Morbidity and mortality remain high with fairly long consultation and management delays.

The organization and coordination of the intra-hospital care pathway are essential to reduce diagnostic and therapeutic delays. It is therefore necessary to consider the management of DSAE as a global chain of care to improve the quality of care and postoperative outcomes.

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**Available online :** May 27, 2026

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**Conflict of interest :** None

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#### To cite this article

M Faye, B Ndiaye, B Abamou, CV Bouma, M Mboup, M Seck et al. Digestive Surgical Abdominal Emergencies: Epidemiological, Diagnostic, Therapeutic and Prognostic Aspects at the Hôpital Principal de Dakar. *Jaccr Surgery* 2026; 2(2): 57-66 <https://doi.org/10.70065/2622.jaccrSurg.003L022705>