

Early Postoperative Deaths in the Surgical Intensive Care Unit of CHU-Kara

Essohanam Tabana Mouzou^{1*}, Sarakawabalo Assenouwe¹, Pikabalo Tchetike², Eyram Yoan Makafui Amekoudi³, Tchaa Hodabalo Towoezim⁴

¹Department of Anesthesia and Intensive Care at CHU-Kara, Kara, Togo

²Anesthesia Resuscitation Service at CHU-Sylvanus Olympio in Lomé, Lomé, Togo

³Medical Resuscitation and Nephrology Department of CHU-Kara, Kara, Togo

⁴Trauma Service CHU-Kara, Kara, Togo

Email: eyramyoan@gmail.com, antoinetowezim@yahoo.com, sassenouwe@yahoo.fr,

ftchet5@hotmail.fr, *essohanam2004@yahoo.fr

How to cite this paper: Mouzou, E.T., Assenouwe, S., Tchetike, P., Amekoudi, E.Y.M. and Towoezim, T.H. (2023) Early Postoperative Deaths in the Surgical Intensive Care Unit of CHU-Kara. *Open Journal of Internal Medicine*, 13, 32-50.

<https://doi.org/10.4236/ojim.2023.131005>

Received: December 7, 2022

Accepted: March 6, 2023

Published: March 9, 2023

Copyright © 2023 by author(s) and Scientific Research Publishing Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Aim: Review of early postoperative deaths in the surgical intensive care unit at CHU-Kara. **Introduction:** Surgery, one of the means of treatment of diseases, also presents risks for the patient, including early postoperative death linked to numerous risk factors. **Methodology:** This was a retrospective descriptive study conducted on the records of patients who died within 48 hours after surgery from November 1, 2019 to April 30, 2021. The study was conducted in the surgical intensive care unit and in the operating room. **Results:** Thirty-two early postoperative deaths or 2.22% out of 1442 operated with 30 deaths retained for the study. Male gender predominated (70%). The average age was 31.22 years. Farmers were more concerned (66.67%). The time to surgery was 1.6 days. ASA1 patients (40%) predominated followed by ASA IV (30%). 80% of patients were operated on as an emergency. Digestive pathologies 80% were more represented. General anaesthesia 86.66% was more practiced associating Propofol, Fentanyl, Ketamine and Atropine more frequently. The average duration of the procedures was 132.5 minutes. Intraoperative complications were associated with cardiac arrest and hemorrhage (33.34%). ASA class higher than 2, dirty surgery (46.67%), and delayed recovery (13.34%) were the incriminating risk factors. Death by hemodynamic shock and respiratory distress were the main causes 26.66%. **Conclusion:** Early postoperative mortality was high and involved all ages. Anesthesia and surgery, the low level of qualification of the intraoperative actors, the lesser intraoperative security; the association of anesthetic effects, the complexity of intraoperative lesions led to the increase of mortality. The combination of two or more factors was pejorative for the deaths.

Keywords

Mortality, Early Postoperative, Surgical Resuscitation, CHU-Kara, Togo

1. Introduction

Surgery is a branch of medicine that involves manual and instrumental intervention. Globally 313 million surgical procedures are performed each year and approximately 4.2 million postoperative deaths occur each year, accounting for 7.7% of global mortality. Events occur during and after surgery that constitute intraoperative and postoperative complications, including death. A death occurring after surgery is called postoperative death. It can be early or immediate if it occurs within forty-eight (48) hours and late if it occurs within thirty (30) days [1].

Surgery is an integral part of effective health systems, with surgical diseases accounting for 30% of the global burden of disease [2].

Postoperative mortality is one of six surgical indicators identified by the Lancet Commission on Global Surgery to monitor access to high-quality surgical care [3].

Postoperative mortality is the oldest form of criticism and evaluation in surgery [4], and in an intensive care unit.

In a hospital department, such a study allows a control and review of therapeutic measures; these are likely to deteriorate in their implementation over the years, which requires periodic criticism [5].

Despite constant progress in surgery and anesthesia, the mortality rate related to surgery in industrialized countries is estimated at 0.4% to 0.8%, and the rate of serious post-operative complications at 3% to 16%. In developing countries, the mortality rate is 5% to 10%. Each year, approximately seven million patients suffer from surgical complications, of which at least one million die during or immediately after surgery [6].

Very few studies have been carried out in Togo on this subject, but some have shown a rate of 15.3% in 2006 [6].

What about early postoperative deaths in the surgical intensive care unit at CHU-Kara? To answer this question, we proposed to take stock of early postoperative deaths in the surgical intensive care unit of this hospital with the specific objectives of

- to identify the cases of early postoperative deaths;
- to identify the risk factors for pre, per and postoperative death;
- to analyze the risk factors.

2. Methodology

Our study took place in the surgical resuscitation department and operating room of the University Hospital of Kara (CHU-Kara), a national reference cen-

ter in the northern part of Togo covering one third of the Togolese population. It has a capacity of 204 beds.

The surgical rehabilitation had a capacity of 8 beds.

It was equipped with two multiparametric monitors, one of which was functional, a functional respirator, a syringe pump, a saturemeter, emergency drugs, and a laryngoscope.

One anesthesiologist resuscitator (and for a third of the population of Togo), one anesthesiologist paramedic; four (4) nurses; four (4) patient guards ensured the activities in surgical resuscitation. A team composed of a nurse, a paramedical anesthetist serving both the operating room and the resuscitation covered during the same period the activities of the surgical resuscitation and a patient guard every day including weekends and holidays.

There were three (3) operating rooms. The anesthesiologist resuscitator (head of anesthesia and resuscitation); surgeons (2 visceral surgeons, a neurosurgeon, a pediatric surgeon, three urological surgeons, an ophthalmologist, two ENT, two traumatologists, an obstetrician gynecologist); six (6) nurse anesthetists; five (5) instrumentalists; six (6) nurses; two (2) DES of general surgery and one DES of gynecology and obstetrics provided anesthesia and surgery.

This was a retrospective chart review of patients who died in early postoperative care from November 1, 2019 to April 30, 2021 (18 months). Data collection was performed from May 11 to October 12, 2021 (06 months).

Included were the records of all patients operated in emergency or program, and died within 48 hours after surgery during the study period in surgical resuscitation.

Excluded were the records of patients operated in emergency, or in program, who died intraoperatively, or postoperatively in the ICU after 48 hours, or outside the ICU.

The means used were medical records, therapeutic and monitoring sheets, anesthesia records, surgical report registers, surgical resuscitation registers, and anesthesia registers of the operating room.

A self-developed data collection support form was used (see **Appendix**). It is not a questionnaire.

The data were collected from medical and anesthetic records, treatment sheets, operative report registers, and anesthesia sheets. The supervisors of the surgical resuscitation and operating room departments were questioned about the structure, human and material resources, and work organization.

The parameters studied were:

- Preoperative risk factors: sociodemographic and epidemiological data; reason for and delay in consultation or admission; clinical status of the patient, ASA classification; personal medical, obstetrical and surgical history, family history, current treatments.
- Intraoperative risk factors: surgical lesion; procedure performed, emergency or scheduled surgery, intraoperative adverse events, time to surgical treat-

ment, duration of surgery, type of anesthesia and anesthetic drugs used, intraoperative complications.

Early postoperative risk factors: postoperative complications, favouring factors (patient-related, surgical and anaesthetic).

- Obvious causes of death.

The survey form was used to collect data.

The main criterion was mortality within 48 hours after surgery.

The qualitative data were expressed as numbers and percentages.

For the study to be carried out, a written request for authorization was submitted by the research team and countersigned by the team leader to the director of the CHU-Kara. This request received a favorable opinion from the director, which allowed the work to begin on May 11, 2021.

3. Results

Sociodemographic and Epidemiological Aspects

Number patients: Thirty-two early postoperative deaths or 2.22% out of 1442 operated with 30 deaths retained for the study.

Sex of deaths: There were 21 (70%) male and 9 (30%) female deaths with a sex ratio of 2.33.

1) Ages of deceased patients

The mean age was 31.22 years with the extremes of D1 and 75 years.

D1 corresponds to one (1) day of life.

2) Profession of deceased patients

3) Time to surgery

The average time to surgery was 1.6 days with extremes of 0 and 8 days.

4) Clinical aspects

a) History and associated pathologies of the deceased patients

Two patients were hypertensive, one patient was operated for acute appendicitis.

b) Pathologies of the deceased children

Two children had omphalocele, one child had Hirschprung's disease. Acute intestinal intussusception was diagnosed in three children. Anorectal malformation was diagnosed in one child.

5) Physical condition of the deceased patients: ASA score

6) Surgical aspects

a) Circumstances of surgery

Twenty-four (80%) patients were operated on as emergencies and 6 patients (20%) were operated on as a program.

b) Intraoperative surgical lesions

7) Duration of surgery

The average duration was 132.5 minutes with extremes of 60 and 240 minutes.

8) Anesthesiological aspects

a) Types of anesthesia

General anaesthesia was used in 26 patients (86.66%) and 4 patients (13.34%) received locoregional anaesthesia.

b) Anesthetic drugs used

9) Complications

a) Intraoperative complications

b) Postoperative complications

10) Risk Factors

a) Risk factors related to the patients' past history and associated pathologies

b) Risk factors for infection

c) Surgical risk factors

d) Anesthetic risk factors

e) Obvious causes of postoperative death

f) Correlation between preoperative risk factors

The relationship between age and intervention delay is not significant.

The relationship between gender and intervention delay is not significant.

The relationship between farmer and intervention delay is significant.

g) Correlation between intraoperative risk factors

Digestive surgery had a correlation with mode of surgery.

General anesthesia had a correlation with mode of surgery.

The duration of the operation did not correlate with the mode of operation.

h) Correlation between postoperative risk factors

Dirty and contaminated surgery correlated with postoperative complications.

General anesthesia correlated with postoperative complications.

Duration of surgery correlated with postoperative complications.

Intraoperative complications correlated with postoperative complications.

4. Discussion

Our discussion focused on:

Methodology (limitations or difficulties of the study);

Sociodemographic and epidemiological aspects;

Clinical aspects; surgical aspects;

Complications; risk factors; obvious causes of death;

Correlation between preoperative risk factors;

Correlation between intraoperative risk factors;

Correlation between postoperative risk factors.

5. Methodology (Limitations)

The retrospective descriptive study focused on early postoperative deaths in the surgical intensive care unit at CHU-Kara during an 18-month period.

The difficulties were related to the retrospective study: by the inexistence of a death register; in 15 files it was impossible to collect certain data (hence the notion of not informed). Two files were not usable and were not taken into ac-

count.

5.1. Sociodemographic and Epidemiological Aspects

Number of patients: thirty-two (32) deaths occurred out of 1442 operated on in 18 months with an early postoperative mortality rate of 2.22%.

This rate seems very high in our context, depending on the standard of living of the population, the inadequacy of the technical facilities and the non-medicalization of anesthesia, which was noted since 2008 by Ouro-Bang'na [7] in Togo with a rate of 0.89%. There is a clear difference at 420 km from Lomé (in Kara).

Hajanindrina [8] in Madagascar and Mallol [9] in Spain found a respective rate of 1.6% in 2016 and 0.8% in 2013. The result of Hajanindrina [8] was lower but still characterized by the phenomenon of underdevelopment while Mallol [9] in Spain was lower with the characteristics of high means countries.

According to Assouto [10], the under-equipment of health facilities and the glaring absence of qualified personnel (almost non-existence of anesthesiologist in our context) constitute a real handicap for the management of anesthesiology.

According to Meara [11], remarkable progress has been made in global health over the last 25 years, but this progress has not been uniform. Mortality and morbidity from common conditions requiring surgery have increased in the poorest countries or regions of the world. At the same time, the development of safe, essential, life-saving surgical and anesthetic care in low- and middle-income countries has stagnated or regressed. In the absence of surgical care, lethality and mortality rates remain high for common and easily treated conditions.

Male patients were the most affected by early postoperative mortality with a sex ratio of 2.33. This result would be related to the number of male patients operated on, which was more numerous than the female sex contrary to that of Ouro-Bang'Na [7] in 2008.

This result is identical to that of Serji [4] in Morocco in 2010. In Spain with Mallol [9] and in Madagascar with Hajanindrina [8] the male sex was more represented respectively (68%, 72.13%). Women generally use health care services more and faster than men.

The average age was 31.22 years and the age group [16 - 30 years] had 10 patients (30%) (See **Table 1**). This predominance of young people is related to the young population in our developing country context. On the other hand, Mallol [9] in Spain in 2013 found the age range [61 - 81] predominant. This older population is characteristic of developed countries.

In Africa, patients are younger and undergo less extensive procedures. In theory, mortality should therefore be lower than elsewhere, but according to Massamba Diop [12], the opposite is true, in particular because of postoperative complications dominated more by postoperative infections and by delays in

Table 1. Age distribution of deceased patients.

| Year | Number | Percentage |
|---------|--------|------------|
| 0 - 15 | 7 | 23.33 |
| 16 - 30 | 10 | 30 |
| 31 - 45 | 4 | 13.33 |
| 46 - 60 | 5 | 16.67 |
| 61 - 75 | 4 | 13.33 |
| Total | 30 | 100.00 |

consultation and treatment.

Farmers were the most affected by mortality with a rate of 66.67% (**Table 2**). This result would be related to the fact that the population of the city of Kara and its surroundings was dominated by peasants who did not respect hygiene and disease prevention measures. Results found by Koffi [13] in Côte d'Ivoire were similar with a rate of 51.4%. This predominance of farmers with a low socio-economic level and the absence of health coverage favored delays in consultation and treatment. The extension of health insurance to this socio-professional class, which is underway in our context, will reduce deaths related to delays in consultation and treatment.

The mean delay to surgery was 1.6 days (**Table 3**). This delay was long. Insufficient financial means to honor the prescriptions was one of the factors prolonging this delay. On the other hand, according to Tavernier B [14], in developed countries, emergency surgeries were performed after admission, followed by management with a short delay because there is functional universal health coverage (especially in emergency).

5.2. Clinical Aspects

1) Congenital malformation of deceased patients

42.85% of the children had a malformation that was a risk factor. The causes of these malformations were not well known.

2) Physical condition of the patient: ASA score (**Table 4**)

Patients with an ASA I score were in the majority with a rate of 40%. These patients were probably poorly evaluated or poorly managed intra- and postoperatively. This refers to the non-medicalization of anesthesia in our context where there was only one anesthesiologist to supervise the anesthesia 24 hours a day, 7 days a week. For the other patients, the risk was higher (ASA > 2) and would better explain these deaths. Fecho [15] in 2008 found that the majority of patients who died in early postoperative care were ASA V. Mallol [9] on the other hand found 84% of patients to be ASA II.

The higher the ASA score, the greater the risk of complications and death.

3) Surgical aspects

Urgent surgery represented 80% and was a high risk factor for complications.

Table 2. Distribution of deceased patients according to profession.

| | Number | Percentage |
|---------------|--------|------------|
| Peasant | 20 | 66.67 |
| Miner | 7 | 23.34 |
| Civil servant | 2 | 6.66 |
| Student | 1 | 3.33 |
| Total | 30 | 100 |

Table 3. Distribution of deceased patients according to time to surgery.

| Hour | Number | Percentage |
|-------|--------|------------|
| 0 - 2 | 24 | 80 |
| 3 - 6 | 4 | 13.34 |
| 7 - 8 | 2 | 6.66 |
| Total | 30 | 100 |

Table 4. Distribution of deceased patients according to ASA score.

| | Number | Percentage |
|---------|--------|------------|
| I | 12 | 40 |
| IV | 9 | 30 |
| V | 2 | 6.66 |
| Unknown | 7 | 23.34 |
| Total | 30 | 100 |

Hajanirina and Assouto [8] [10] found higher rates, respectively 86% and 89.2%. This is characteristic of the surgical management in developing countries. Contrary to studies done in developed countries, with a lower rate, Fecho K in the USA, Tavernier in France and Mallol in Spain [9] [14] [16] respectively 30%, 42% and 49.9%.

Mortality was particularly high in patients operated on in emergency, proven by the literature Meara and Koffi [11] [13]. This difference in rates between developing and developed countries can be explained by the rapid and efficient management of the patient, with a high performance technical platform and a sufficient number of high performance personnel, which was not the case in our context where the means and conditions were deficient and the anaesthesia was not medicalized according to Ouro-Bang'Na [7].

4) According to the type of lesion

Digestive surgical pathologies were diagnosed in 76.66% of the deceased patients (Table 5).

Surgical emergencies of the gastrointestinal tract had accounted for a significant share of surgical pathologies. According to Sama [17] in 2017 in Togo, 59% of emergencies were abdominal emergencies.

Table 5. Distribution of patients who died according to the intraoperative surgical lesion.

| | Number |
|--|--------|
| Volvulus colon | 1 |
| Peritoneal abscess | 1 |
| Cellulitis | 1 |
| Post-operative hemorrhagic shock | 1 |
| Abdominal contusion | 3 |
| Crushing of the lower limbs | 2 |
| Postoperative fistula | 1 |
| Vulvar fistula | 1 |
| Gangrene of the right leg | 1 |
| Strangulated inguinal hernia | 2 |
| Acute intestinal invagination | 2 |
| Mesenteric infection | 1 |
| Hirschprung's disease | 1 |
| Ruptured omphalocele | 2 |
| Pelvipерitonitis | 1 |
| Generalized peritonitis | 1 |
| Appendicular peritonitis | 1 |
| Gastric perforation peritonitis | 2 |
| Penetrating gunshot wound of the abdomen | 1 |
| Preeclampsia | 1 |
| Ilium tumor | 1 |
| Right colonic angle tumor | 1 |
| Gastric tumor | 1 |
| Total | 30 |

Digestive surgical pathologies have a very high frequency of mortality due to hypovolemic and septic shock.

5) Surgical treatment

Digestive surgery predominated the table (76.66%) (**Table 6**).

These surgeries were the source of many complications leading to immediate postoperative death.

This result is almost identical to the data collected by Tavernier and Mallol [9] [14] respectively 89.58% and 76.25%.

Digestive surgeries were highly infectious dirty surgeries with a significant risk of complications and death.

6) Duration of surgery (**Table 7**)

The average duration was 132.5 minutes in our study, this long duration would be related to complex surgeries or surgeries performed by the learners

Table 6. Distribution of patients according to the duration of the operation.

| Minutes | Number |
|-----------|--------|
| 60 | 1 |
| 105 | 2 |
| 110 | 3 |
| 120 | 6 |
| 135 | 5 |
| 140 | 4 |
| 150 | 2 |
| 240 | 3 |
| Not known | 4 |
| Total | 30 |

Table 7. Distribution of patients according to the anesthetic drugs used.

| | Number of patients |
|-------------------------------------|--------------------|
| General anesthesia | |
| Protocol 1: Propofol + Fentanyl | 2 |
| Protocol 2: Ketamine + Atropine | 2 |
| Protocol 3: Fentanyl + Atropine | 1 |
| Protocol 4: Protocol 3 + Diazepam | 2 |
| Protocol 5: Protocol 2 + Fentanyl | 2 |
| Protocol 6: Protocol 2 + Diazepam | 2 |
| Protocol 7: Protocol 1 + Atropine | 1 |
| Protocol 8: Protocol 1 + Protocol 2 | 5 |
| Protocol 9: Protocol 8 + Diazepam | 3 |
| Protocol 10: Protocol 7 + Midazolam | 1 |
| Protocol 11: Protocol 6 + Fentanyl | 3 |
| Not known | 2 |
| Local Anesthesia | |
| Bupivacaine + Morphine | 4 |
| Total | 30 |

(junior).

Our result is similar to that of Bonkoungou [18] who reported an average duration of 125.62 minutes.

Harouna [19], in his study on intestinal obstructions, noted an average operating time of 3 hours in 92% of postoperative deaths.

This long duration can be a factor in complications and mortality. The longer the duration of the procedure, the more the risks associated with anesthesia syn-

ergize with the surgical aggression. Short surgery in patients in poor condition would decrease morbimortality.

5.3. Anesthesiological Aspects

1) Type of anesthesia

General anaesthesia was performed in 86.66% of the deceased patients, it was the most indicated according to the surgical lesions presented by the deceased patients (digestive pathologies).

These results were close to those of Hajanirina [3] who found 79.1%. This anesthesia was known to be associated with cardiovascular, respiratory and neurological complications.

2) Anesthetic drugs used

The protocol associating the drugs Propofol + Fentanyl + Ketamine + Atropine was more used for general anesthesia (Table 8). Given the surgical lesions, the clinical condition of the patients, and the accessibility of the above-mentioned products, the products most indicated were the least aggressive and the least toxic.

3) Intraoperative complications

They were represented by intraoperative cardiac arrest and hemorrhage in 20% of cases (Table 9). This result would be related to the advanced pathology and/or the complexity of the surgical lesion or the incompetence of the actors and/or the side effects of the anesthetic drugs. These intraoperative complications were the significant risk in the occurrence of postoperative complications (82.30%).

4) Postoperative complications

They were dominated by medical complications (46.66%) (Table 10), represented by cardiovascular complications. The extent of the lesions and the significant blood loss during the operations could explain these results. Complications in our context were lower than that of Fecho [16] with 85%.

Postoperative complications were significantly correlated with the duration of the operation (57.90%), general anaesthesia (84.60%); contaminated and dirty surgery (76.5%).

Table 8. Distribution of patients according to intraoperative complications.

| | Number | Percentage |
|----------------------|--------|------------|
| Cardiac arrest | 6 | 20 |
| Hemorrhage | 4 | 13.34 |
| Bradycardia | 2 | 6.66 |
| Arterial hypotension | 2 | 6.66 |
| Hypoxia | 2 | 6.66 |
| Unknown | 14 | 46.68 |
| Total | 30 | 100 |

Table 9. Distribution of patients according to postoperative complications.

| | Number | Percentage |
|--|--------|------------|
| Medical | | |
| Following an intraoperative cardiac arrest | 6 | 20 |
| Shock | 2 | 6.67 |
| DIC | 1 | 3.33 |
| Sepsis | 5 | 16.67 |
| Surgical | | |
| Postoperative digestive fistula | 1 | 3.33 |
| Post-operative hemorrhagic shock | 1 | 3.33 |
| Unknown | 14 | 46.67 |
| Total | 30 | 100 |

Table 10. Distribution of patients according to patient-related risk factors.

| | Number | Percentage |
|-------------------------------|--------|------------|
| Advanced stage of the disease | 11 | 36.66 |
| High blood pressure | 2 | 6.66 |
| Coagulation disorder | 1 | 3.37 |
| Not known | 17 | 56.67 |
| Total | 30 | 100.00 |

There was a clear evolution in the management between 2002 and 2006 according to Ouro-Bang'Na [7] but the interior of Togo is at a disadvantage with the example of the Kara University Hospital with 2.22% of early postoperative mortality.

6. Risk Factors

1) Patient-related risk factors (Table 11)

Half (50%) of the patients who died had consulted late and were therefore in the advanced stages of their disease. The low socioeconomic level of the population and the delay in treatment were risk factors for mortality in our context as in developing countries.

2) Surgical risk factors

Dirty surgery was performed in 46.67% of cases (Table 12). It was associated with urgent, complex and/or advanced digestive surgical pathologies aggravating the risk factors. Intraoperative hemorrhage was the major risk factor.

3) Anesthetic risk factors (Table 13)

Delayed awakening was the most frequent factor in the patients who died, with a proportion of 16.66%, and general anaesthesia favoured postoperative complications in 84.60% of cases.

Table 11. Distribution of patients according to Altémeier class.

| | Number | Percentage |
|----------------------------|--------|------------|
| Dirty surgery | 14 | 46.67 |
| Clean contaminated surgery | 12 | 40 |
| Contaminated surgery | 3 | 10 |
| Clean surgery | 1 | 3.33 |
| Total | 30 | 100 |

Table 12. Distribution of patients by surgical risk factors.

| | Number | Percentage |
|------------------------|--------|------------|
| Postoperative bleeding | 4 | 13.34 |
| Cancer surgery | 3 | 10 |
| Deep vein thrombosis | 1 | 3.33 |
| Not known | 22 | 73.33 |
| Total | 30 | 100 |

Table 13. Distribution of patients according to anesthetic factors.

| | Number | Percentage |
|-------------------------------------|--------|------------|
| Duration of more than 120 minutes | 11 | 36.66 |
| Delayed recovery | 4 | 13.34 |
| Intraoperative bradycardia | 2 | 6.66 |
| Intraoperative arterial hypotension | 2 | 6.66 |
| Intraoperative hypoxemia | 3 | 10 |
| Unknown | 8 | 26.67 |
| Total | 30 | 100 |

Anesthesia had a correlation with the mode of operation and contributed to the occurrence of postoperative mortality in our context.

4) Obvious causes of postoperative deaths (Table 14)

The etiologies of death were more of a cardiovascular nature with a proportion of 20%. For Koffi, Yenon, Hajanirina and Tavernier [8] [13] [14] [20] infectious etiologies were the most represented with respectively 43.05%; 40%; 54.54% and 42%.

This disparity is explained by the fact that septic shock is the first cause of postoperative death in these countries, and the physical condition and age of the patients favored septic shock.

5) Correlation between preoperative risk factors

Twenty (66.67%) patients were the farmers, had consulted late (Table 15). Ten patients (33.33%) had consulted early.

There was a statistically significant relationship between occupation and delay

Table 14. Distribution of patients by causes of postoperative death.

| | Number | Percentage |
|----------------------------|--------|------------|
| Cardiogenic shock | 3 | 6.66 |
| Hemorrhagic shock | 4 | 13.34 |
| Septic shock | 5 | 16.67 |
| Acute respiratory distress | 2 | 6.66 |
| Multivisceral failure | 4 | 16.67 |
| Unknown | 12 | 40 |
| Total | 30 | 100 |

Table 15. Correlation between socio-demographic data and intervention delay.

| Sociodemographic data | Intervention delay | | Total 30 (%) | P |
|-----------------------|--------------------|----------|--------------|---|
| | ≤2 n (%) | >2 n (%) | | |
| Age 0.675 | | | | |
| ≤45 | 19 (90.5) | 2 (9.5) | 21 (70) | |
| >45 | 5 (55.5) | 4 (44.5) | 9 (30) | |
| Sex 0.950 | | | | |
| M | 16 (76.2) | 5 (23.8) | 21 (70) | |
| F | 8 (88.9) | 1 (11.1) | 9 (30) | |
| Farmer 0.0021 | | | | |
| Yes | 16 (66.7) | 4 (66.7) | 20 (66.7) | |
| No | 8 (33.3) | 2 (33.3) | 10 (33.3) | |

in consultation ($p = 0.00001$).

Poverty, self-medication and ignorance of serious diseases were the factors explaining this delay in consultation by the peasants.

6) Correlation between intraoperative risk factors

Twenty-three (76.70%) patients with digestive surgical pathologies were operated on as emergencies (**Table 16**). There was a statistically significant correlation between digestive surgery and urgent intervention ($p = 0.04231$). The emergency with its factors combine with the unfavorable hemodynamic factors to create more aggravation of the postoperative evolution.

General anesthesia was performed in 26 (86.70%) patients in emergency.

There was a statistically significant correlation between the circumstances of intervention and the type of anesthesia ($p = 0.03884$). General anesthesia offers a similar situation of unfavorable hemodynamics and emergency factors to accentuate the poor postoperative course.

Perioperative management of abdominal surgical emergencies remains a major concern due to intraoperative hemodynamic and metabolic disorders, but also postoperative complications.

Table 16. Correlation between intraoperative risk factors and mode of operation.

| Intraoperative risk factor | Mode of operation | | | P |
|------------------------------|-------------------|------------------|--------------|---------------|
| | Semercyncn (%) | Programmed n (%) | Total 30 (%) | |
| Digestive surgery | | | | 0.04231 |
| Yes | 20 (87) | 3 (13) | 23 (76.7) | |
| No | 5 (71.4) | 2 (28.6) | 7 (23.3) | |
| General anesthesia | | | | 0.03884 |
| Yes | 21 (80.7) | 5 (19.3) | 26 (86.7) | |
| No | 2 (50) | 2 (50) | 4 (13.3) | |
| Duration of procedure | | | | 19.146 |
| <120 min | 11 (57.9) | 8 (42.1) | 19 (63.3) | |
| ≥120 min | 8 (72.7) | 3 (27.3) | 11 (36.4) | |

Table 17. Correlation between risk factors and postoperative complications.

| Risk factors | Postoperative Complications | | | P |
|---------------------------------------|-----------------------------|-----------|--------------|---------|
| | Yes n (%) | No n (%) | Total 30 (%) | |
| Contaminated and dirty surgery | | | | 0.00584 |
| Yes | 13 (76.5) | 4 (23.5) | 17 (56.7) | |
| No | 3 (23.1) | 10 (76.9) | 13 (43.3) | |
| General anesthesia | | | | 0.04389 |
| Yes | 22 (84.6) | 4 (15.4) | 26 (86.7) | |
| No | 2 (50) | 2 (50) | 4 (13.3) | |
| Duration of procedure | | | | 0.03370 |
| <120 min | 11 (57.9) | 8 (42.1) | 19 (63.3) | |
| ≥120 min | 10 (90.9) | 1 (9.1) | 11 (36.4) | |
| Intraoperative complications | | | 6 | 0.0277 |
| Yes | 14 (82.3) | 3 (17.6) | 17 (56.7) | |
| No | 3 (23.1) | 10 (76.9) | 13 (43.3) | |

7) Correlation between postoperative risk factors

Fourteen (46.66%) patients had undergone dirty surgery and had experienced cardiovascular complications and delayed recovery postoperatively (**Table 17**). Twelve patients (40%) had undergone contaminated clean surgery.

There was a statistically significant correlation between dirty surgery and postoperative complications ($p = 0.000891$).

Intraoperative hemodynamic instability, general anesthesia and its cardiovas-

cular complications had favored deaths.

7. Conclusions

The study had difficulties and limitations for its realization, inherent to a retrospective study.

At the end of the study we retained:

The early postoperative mortality rate was 2.22%. The majority of patients were male. Most of them were young.

Low socioeconomic status, delayed consultation, patient condition, and congenital malformations were preoperative risk factors.

The long delay of intervention, digestive surgical pathologies, and surgeries performed in emergency, general anesthesia, the occurrence of intraoperative cardiac arrest, and the non-medicalization of the anesthesia were intraoperative risk factors.

Cardiovascular complications, delayed recovery, dirty or infected surgery were the postoperative risk factors.

Cardiovascular damage was the additional cause of death in the majority of cases.

Intraoperative complications were high, as were very high postoperative complications.

Anesthesia and surgery, additional intraoperative factors; as well as the low level of qualification of the intraoperative actors, the lower intraoperative security; the combination of anesthetic effects, the complexity of intraoperative lesions and the level of management due to the low level of the actors led to the increase of this mortality.

The combination of two or more factors was pejorative for the majority of deaths.

Parameters were missing to show the epidemiological aspect, but these results encourage further work to improve the therapeutic principles.

Once again, the study sheds light on the socioeconomic factors (poverty), the pre, per and postoperative risk factors.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Nepogodiev, D., Martin, J., Biccard, B., *et al.* (2019) Global Burden of Postoperative Death. *The Lancet*, **393**, 401. <https://pubmed.ncbi.nlm.nih.gov/30722955>
[https://doi.org/10.1016/S0140-6736\(18\)33139-8](https://doi.org/10.1016/S0140-6736(18)33139-8)
- [2] Shrime, M.G., Bickler, S.W., Alkire, B.C. and Mock, C. (2015) Global Burden of Surgical Disease: An Estimation from the Provider Perspective. *The Lancet Global Health*, **3**, S8-S9. <https://linkinghub.elsevier.com/retrieve/pii/S2214109X14703845>
[https://doi.org/10.1016/S2214-109X\(14\)70384-5](https://doi.org/10.1016/S2214-109X(14)70384-5)

- [3] Wurdeman, T., Strader, C., Alidina, S., *et al.* (2021) In-Hospital Postoperative Mortality Rates for Selected Procedures in Tanzania's Lake Zone. *World Journal of Surgery*, **45**, 41-49. <https://doi.org/10.1007/s00268-020-05802-w>
- [4] Serji, B. (2010) Postoperative Mortality in the Visceral Surgery Department "A" of CHU Ibn Sina Rabat between 2000 and 2009.
- [5] Proye, C., Camp, D., Triboulet, J.P., *et al.* (1988) Mortality in a General Surgery Department of a University Hospital. Study of the Year 1985: 1409 Tuned, 45 Postoperative Deaths. *Journal De Chirurgie*, **25**, 255-259. [https://www.scirp.org/\(S\(lz5mqp453ed%20snp55rrgjt55\)\)/reference/referencespapers.aspx?referenceid=2970789](https://www.scirp.org/(S(lz5mqp453ed%20snp55rrgjt55))/reference/referencespapers.aspx?referenceid=2970789)
- [6] Haute Autorité de Santé (2008) Checklist: Patient Safety in the Operating Room. A Program to Reduce Perioperative Complications. HAS, Paris, 1-2. https://www.researchgate.net/publication/320123388_Faisabilite_et_pertinence_de_la_checklist_de_securite_au_bloc_operatoire_central_du_Centre_Hospitalier_Regional_de_Saint_Louis_du_Senegal
- [7] Ouro-Bang'na Maman, A.F., Agbétra, N., Egbohohou, P., Sama, H. and Chobli, M. (2008) Perioperative Morbidity-Mortality in a Developing Country: Experience of Lomé University Hospital (Togo). *Annales Françaises d'Anesthésie et de Réanimation*, **27**, 1030-1033. <https://doi.org/10.1016/j.annfar.2008.08.015>
- [8] Hajanindrina Antsa Tsifoïna (2016) Postoperative Mortality in Digestive Surgery at Analankininina Toamasina University Hospital.
- [9] Mallol, M., Sabaté, A., Dalmau, A. and Koo, M. (2013) Risk Factors and Mortality after Elective and Emergent Laparatomies for Oncological Procedures in 899 Patients in the Intensive Care Unit: A Retrospective Observational Cohort Study. *Patient Safety in Surgery*, **7**, 29. <https://doi.org/10.1186/1754-9493-7-29>
- [10] Assouto, P., Tchaou, B., Kangni, N., *et al.* (2009) Early Postoperative Evolution in Digestive Surgery in Tropical Environment.
- [11] Meara, J.G., Leather, A.J.M., Hagander, L., *et al.* (2015) Global Surgery 2030: Evidence and Solutions for Achieving Health, Welfare, and Economic Development. *The Lancet*, **386**, 569-624. [https://doi.org/10.1016/S0140-6736\(15\)60160-X](https://doi.org/10.1016/S0140-6736(15)60160-X)
- [12] Diop, M. and Frenk, C. (2018) Africa's Operative Mortality Rate Higher than the Rest of the World. RFI2018.
- [13] Koffi, K.M., Ouattara, B., Sangaré, A.D., *et al.* (2018) Study of Mortality and Causes of Death in the Service of Stomatology, Maxillofacial and Plastic Surgery of the Face at Cocody Teaching Hospital (RCI). *Open Journal of Stomatology*, **8**, 338-344. <https://doi.org/10.4236/ojst.2018.812032>
- [14] Tavernier, B., Sanchez, R., Pattou, F., *et al.* (2000) Postoperative Mortality: Low Incidence of Cardiac Deaths in a University General Surgery Department.
- [15] Fecho, K., Moore, C., Lunney, A., *et al.* (2008) Anesthesia-Related Perioperative Adverse Events during In-Patient and Out-Patient Procedures. *International Journal of Health Care Quality Assurance*, **21**, 396-412. <https://doi.org/10.1108/09526860810880207>
- [16] Fecho, K., Lunney, A.T., Boysen, P.G., Rock, P. and Norfleet, E.A. (2008) Postoperative Mortality after Inpatient Surgery: Incidence and Risk Factors. *Therapeutics and Clinical Risk Management*, **4**, 681-688. <https://doi.org/10.2147/TCRM.S2735>
- [17] Sama, H.D., Mouzou, T., Egbohohou, P., *et al.* (2017) Management of Emergencies in the Surgical Emergency Department of the Sylvanus Olympio University Hospital of Lomé (Togo): Difficulties, Solutions and Perspectives. *Journal of Scientific Research of the University of Lomé*, **19**, 253-260.

- [18] Bonkougou, P., Kaboré, R., Traoré, S., Ouédraogo, A., Bako, Y., Kinda, B., *et al.* (2015) Anesthesia for Acute Surgical Abdomen at the Yalgado Ouédraogo University Hospital of Ouagadougou in Burkina-Faso. *RAMUR*, **20**, 19.
- [19] Harouna, Y., Abdou, I., Saidou, B. and Bazira, L. (2001) Peritonitis in the Tropics: Etiological Particularities and Current Prognostic Factors. A propos de 160 cas. *Medecine d'Afrique Noire*, **48**, 103-106.
- [20] Yénon, K.S., Lebeau, R., Koffi, E., Diané, B., Kassi, B.F.A. and Kouassi, J.C. (2008) Post-Operative Morbidity and Mortality in Non-Traumatic Colon Emergencies. *Mali Medical*, **23**, 38-42.

Appendix. Survey Sheet

- SURVEY SHEET No.....
- Marital status
Name..... First name.....
Age..... Sex F..... M
 - Exam
Occupation.....
Reason and date of admission.....
 - History
Clinical condition of the day.....
 - Personal
Medical: HTADiabetes.... Sickle cell disease.... Epilepsy.....
AsthmaOther (specify)
 - Surgical.....
Obstetrical:
Birth parameters (child)... Resuscitation...Malformation ...Other (specify)..
Current treatments: Corticosteroid therapy... Chemotherapy.....
Radiotherapy and Other (specify).....
Familial: Specify family defects.....
 - Surgery
Type of lesion.....
Procedure performed and date.....
EmergencyScheduled surgery.....
Duration of surgery (minutes)...
 - Anaesthesia
Type of anaesthesia: General.....Locoregional (Specify)
 - Complications
Drugs used.....
Intraoperative anaesthetic complications: hypoxia....Anoxia.... cardiac ar-
rest...
Hypothermia..... Other.....
Post-operative complications: delayed awakening....Shock.....
Intra-operative cardiac arrest..... Other.....
 - Deaths
Contributory factors
Pathological...
Surgical...
Anaesthetics...
Obvious aetiologies: coagulation disorder...advanced stage of disease.....
haemorrhage.....
Other (specify).....