

# Mortality of Neonatal Surgical Emergencies at the Mother and Child University Hospital Jeanne Ebori Foundation (CHUMEFJE) in Libreville

Natacha Boumas<sup>1,2\*</sup>, Quessia Mangono<sup>2</sup>, Hubert Nzue Nguéma<sup>1,2</sup>, Marcelle Abégué<sup>1</sup>, Antonio Sartorio<sup>1</sup>, Daria Mindze<sup>1,2</sup>, Rony Bibang<sup>1,2</sup>, Mélina Nkole Aboughe<sup>1,2</sup>, Lustaire Tsague<sup>1,2</sup>, Francois Ondo Ndong<sup>2</sup>

<sup>1</sup>Paediatric Surgery Department, Mère Enfant Fondation Jeanne Ebori University Hospital, Libreville, Gabon

<sup>2</sup>Department of Surgery and Surgical Specialities, University of Health Sciences, Owendo, Gabon

Email: \*natacha\_boumas@yahoo.fr

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## Abstract

**Introduction:** Mortality among newborns with surgical emergencies is high in developing countries. These deaths have psychosocial consequences for families and the community. **Objective:** To determine the prevalence and epidemiological profile of deaths from neonatal surgical emergencies. **Method:** This was a descriptive retrospective study conducted over a 3-year period on 89 records of patients with neonatal surgical emergencies (NSE), who had or had not undergone surgery and died at the CHUMEFJE. The parameters studied were demographic, diagnostic, and therapeutic aspects. **Results:** During this period, 194 neonatal surgical emergencies were hospitalised and 89 died, representing a mortality rate of 45.8%. The mean consultation time was  $3 \pm 2.9$  days [0 to 11]. Patients were referred to in 46.1% of cases and came from rural areas in 22.5%. The sex ratio was 1.2. Prematurity was found in 55%. The mean term was  $35.8 \pm 3$  weeks [25 - 40]. The mean birth weight was  $2335 \pm 714$  g [600 - 4315]. Digestive atresia and gastroschisis were found in 34.8% and 18% respectively. An associated malformation was found in 11.2%. The mean age of patients at the time of death was  $10.5 \pm 10.9$  days [0 - 43]. Postoperative hospital mortality was 67.4%. The cause of death highlighted was septic shock in 49.4%. The duration of hospitalization was  $9.3 \pm 10$  days. **Conclusion:** Newborn boys with digestive atresia are more vulnerable. Multidisciplinary care could prevent the vicious cycle of sepsis and improve survival rates.

## Keywords

Neonatal Mortality, Emergency, Surgery, Libreville

## 1. Introduction

Neonatal surgical emergencies encompass all conditions in newborns that require urgent surgical intervention due to a life-threatening or functional threat [1]. Neonatal surgical emergencies are a major cause of morbidity and mortality worldwide. Mortality among newborns with surgical emergencies is high in developing countries. These deaths have psychosocial consequences for families and communities [1] [2].

In developed countries, advances in neonatal resuscitation, paediatric anaesthesia and surgical techniques have led to survival rates exceeding 85% - 90% depending on the condition [3] [4].

In sub-Saharan Africa, studies report high mortality rates, varying between 30% and 70% depending on the centre, linked to several factors such as delayed diagnosis, inadequate specialised infrastructure, lack of neonatal intensive care, transport difficulties and high treatment costs [5]-[8]. Mortality remains particularly high in conditions such as oesophageal atresia and laparoschisis [6] [9].

In Gabon, few studies have been published on neonatal surgical mortality. The Centre Hospitalier Universitaire Mère-Enfant Foundation Jeanne Ebori (CHU-MEFJE), the national reference center for pediatric surgery and neonatology, treats most of these cases. Analyzing mortality in neonatal surgical emergencies in this context is essential to identify associated factors and propose strategies for improvement.

The aim of this study was to determine the prevalence and epidemiological profile of deaths in neonatal surgical emergencies.

## 2. Methods

This is a retrospective descriptive study conducted in the neonatal and pediatric surgery departments of the CHUME FJE in Libreville, Gabon, over a period of three years (1 January 2022 to 31 December 2024). The study included the records of patients aged 0 to 28 days, regardless of gender, who had a neonatal surgical emergency (NSE) requiring immediate or semi-urgent care, whether they had undergone surgery, and who died at the CHUME FJE. Incomplete records and children with late postnatal surgical emergencies (more than 28 days old) were excluded.

The data were extracted from medical records and surgical logs from the pediatric surgery and neonatology departments. The parameters studied were socio-demographic data (age at admission, sex, birth weight, prematurity, geographical origin), clinical data (type of surgical emergency, clinical signs on admission, time to consultation), therapeutic data (type of intervention, time to surgery) and follow-up data (post-operative progress, complications, length of hospitalization, causes of death).

Post-operative hospital mortality is defined as the death of a patient during hospitalisation following surgery, regardless of the length of hospitalisation.

The data were entered and analysed using SPSS software. Quantitative variables

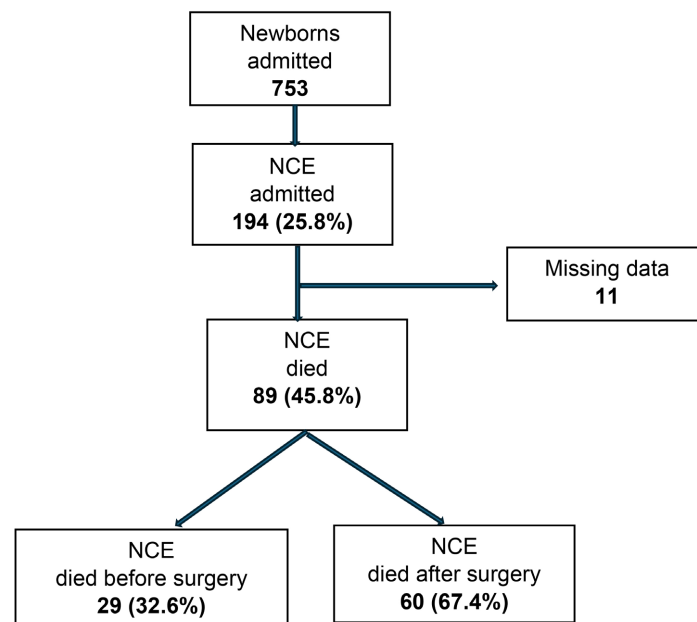
were described using means and standard deviations or medians and intervals, depending on their distribution. Qualitative variables were presented as percentages. The association between independent variables and neonatal mortality was assessed using Pearson's  $\chi^2$  test or Fisher's exact test when the sample size was less than 5. Odds ratios (OR) and their 95% confidence intervals (95% CI) were calculated to estimate the strength of the association between each factor and post-operative mortality. A p-value < 0.05 was considered statistically significant.

The study complied with institutional ethical standards for retrospective chart reviews.

### 3. Results

During this period, 194 NSE were hospitalised and 89 died, representing a mortality rate of 45.8% (**Figure 1**).

Males predominated, with a sex ratio of 1.2. The average gestational age at birth was  $35.8 \pm 3$  weeks of amenorrhea (WA), with extremes of 25 and 40 WA. Prematurity was found in 55% of cases. The average birth weight was  $2335 \pm 714$  g, with extremes of 600 and 4315 g.



**Figure 1.** Sampling flow.

The average time to consult was  $3 \pm 2.9$  days, with extremes of 0 and 11 days. They were referred from another healthcare facility in 46.1% of cases and came from rural areas in 22.5% of cases. The types of NSE are summarized in **Table 1**. An associated malformation was found in 11.2% of cases. Patients underwent surgical treatment in 62.1% of cases. Postoperative hospital mortality was 67.4% of cases. The surgical indications were intestinal resection and anastomosis in 25.4%, primary closure of gastroschisis in 23.7% of cases, colostomy in 16.9% of cases,

and duodenostomy in 10.2% of cases.

**Table 1.** Distribution according to diagnosis.

Diagnosis	N	%
Intestinal atresia	31	35
Gastroschisis/Omphalocele	22	24.7
Ulcerative necrotising enterocolitis	9	10.1
Anorectal malformation	15	16.8
Hirschsprung's disease	6	6.7
Intestinal rotation abnormalities	6	6.7

**Table 2.** Statistical analysis.

	Died n = 89	Lived n = 105	OR	IC 95 %	p
Term			0.14	0.07 – 0.27	< 0.001
Premature	49	15			
Term	40	90			
Sex			1.05	0.60 – 1.86	0.886
Male	48	58			
Female	41	47			
Birth weight			0.18	0.09 – 0.34	< 0.001
<2500 g	52	21			
≥ 2500 g	37	84			
Reference			1.11	0.63 – 1.95	0.774
Yes	41	51			
No	48	54			
Age at consultation			1.40	0.76 – 2.58	0.350
< 3 d	58	76			
≥ 3 d	31	29			
Surgery delay			1.83	0.80 – 4.18	0.152
< 3 d	49	92			
≥ 3 d	11	13			
Diagnostic					
Intestinal atresia	31	21	1.36	0.63 – 2.92	0.432
Gastroschisis/omphalocele	22	11	1.36	0.63 – 2.92	0.432
Anorectal malformation	15	19	0.53	0.23 – 1.23	0.139
Ulcerative necrotising enterocolitis	9	25	0.24	0.10 – 0.55	<0.001

The mean age of patients at the time of death was  $10.5 \pm 10.9$  days, with ex-

tremes of 0 and 43 days. The only major causes identified were septic shock in 49.4% of cases with surgical site infections in 20% of cases and metabolic disorders (50.6%). The mean length of hospital stay was 9.3 days.

Statistical analysis (**Table 2**) revealed that prematurity was significantly associated with increased neonatal mortality (OR = 7.35; 95% CI: 3.48 - 15.5;  $p < 0.001$ ). Similarly, birth weight below 2500 g was an unfavorable prognostic factor, increasing the risk of death more than fivefold (OR = 5.73; 95% CI: 2.89 - 11.4;  $p < 0.001$ ). In contrast, gender was not significantly associated with mortality ( $p = 0.72$ ). Newborns referred from other healthcare facilities had a comparable risk of death to those admitted directly to the CHUMEFJE (OR = 0.95; 95% CI: 0.54 - 1.67;  $p = 0.85$ ). Age at consultation greater than or equal to three days did not significantly influence prognosis ( $p = 0.46$ ). However, a surgical delay of more than three days appeared to be associated with lower mortality, without reaching statistical significance (OR = 0.47; 95% CI: 0.21 - 1.07;  $p = 0.07$ ). In terms of the nature of the conditions, the highest mortality rates were observed in newborns with intestinal atresia (59.6%) and parietal malformations such as gastroschisis or omphalocele (66.7%). Conversely, anorectal malformations (44.1%) and necrotising enterocolitis (26.5%) had a better prognosis.

#### 4. Discussion

The limitations of the study were its retrospective, single-center nature and the absence of statistical analysis.

The mortality rate observed in our series (45.8%) remains high compared to the data reported in several African series and contrasts sharply with those observed in developed countries, where it is less than 10% [7] [10] [11]. This mortality rate reflects the persistence of major difficulties in the management of NSE in our context, including delayed diagnosis, prematurity, low birth weight and failures in the referral chain.

The male predominance found (sex ratio = 1.2) is consistent with the literature, with several studies reporting a slight male majority in NSE [12] [13]. This distribution could be attributed to the higher frequency of certain congenital anomalies in boys, particularly inguinal hernias and small bowel atresia [14].

Prematurity, observed in 55% of patients, is a well-established unfavorable prognostic factor [15]. Premature babies are physiologically immature, which increases the risk of infection, metabolic problems and anesthetic complications. In African series, prematurity varies between 30% and 60% [16]-[18]. The low average birth weight (2335 g) reinforces the impact of this risk factor on post-operative mortality.

The average time for consultation (3 days) remains long for a neonatal condition, where every hour counts. This delay can be explained by families' lack of awareness of warning signs, the lack of medical transport and insufficient antenatal screening. Studies carried out in Nigeria and Madagascar report similar delays of 2 to 5 days [17] [19]. These delays aggravate the initial clinical condition and

limit the chances of survival.

The proportion of referred newborns (46.1%) shows the CHUMEFJE's dependence on the quality of the referral system. However, these patients often arrive in critical condition, sometimes without prior stabilization. Regional studies have shown that transferred newborns have a mortality rate two to three times higher than those treated in situ [20].

The most common pathologies in our series, dominated by digestive malformations (intestinal atresia, gastroschisis, diaphragmatic hernia), reflect the classic profile of neonatal surgical emergencies in Africa [16] [21]. These conditions require appropriate neonatal resuscitation resources, which are still insufficient in most hospitals on the continent.

The high post-operative mortality rate (67.4%) highlights the limitations of peri-operative care, in particular the scarcity of pediatric anesthetists and the shortage of incubators and parenteral nutrition. Septic shock (29.2%) and surgical site infections (20%) were the leading causes of death. These infectious complications are also reported by Ameh [9] and Banda [22], who blame the lack of strict asepsis and the absence of appropriate pediatric intensive care.

Progress made in developed countries, thanks to specialized neonatal surgery, intensive care unit management, and early parenteral nutrition, has led to a dramatic reduction in mortality [11] [23]. Improving the prognosis in Africa therefore requires strengthening the technical and human capacities of pediatric surgery and neonatal intensive care services, as well as establishing effective referral networks.

## 5. Conclusion

In conclusion, premature male newborns with low-birth-weight suffering from digestive atresia are more vulnerable. Multidisciplinary care involving obstetricians, radiologists, anesthetists, pediatricians and surgeons would help to avoid the vicious circle of sepsis and improve survival rates.

## Conflicts of Interest

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

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