Original Article

Congenital Malformations of the Gastrointestinal Tract in Neonates at Aristide Le Dantec University Hospital in Dakar: Concerning 126 Cases

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Abstract

Objective: Congenital malformations of the gastrointestinal tract are one of the major causes of neonatal mortality, especially in developing countries. The aim of this study is to assess the overall management of gastrointestinal malformations. **Patients and Methods:** The study design is monocentric and retrospective. It includes all newborns aged 1–28 days with malformations of the gastrointestinal tract between 1st January 2014 and 31st December2018, at the Paediatric Surgery Department of Aristide Le Dantec University Hospital in Dakar. Data were collected by studying patient's records and surgical procedures. **Results:** During the five-year study, 405 newborns with congenital anomalies were admitted to our hospital. A total of 126 newborns were diagnosed with gastrointestinal tract malformations. The incidence was 25.2 cases a year. The sex distribution was 74 boys (58.7%) and 52 girls (41.2%). The mean age at diagnosis was 7.4 ± 3.2 days. Two cases were diagnosed antenatal (1.59%). The mean time to post-natal diagnosis was 6.5 ± 2.1 days. The most common malformation was oesophageal atresia with 43 cases (34.1%). The average time between diagnosis and surgery was 48 h. Out of the 126 cases, 77 (61.1%) received surgery and 49 (38.9%) died before surgery. The main causes of pre-operative death were intricate and dominated by lung infections (42.9%). Among the 77 newborns, who received surgery, 38 (%) had a simple post-operative course, 39 (50.6 %) died. Post-operative deaths were dominated by anaesthetic complications (30.8%), lung infections (46.1%). The overall mortality was 69.8% ($n = 88$). **Conclusion:** The low socio-economic status, poor pre-natal diagnosis, prematurity, post-natal diagnostic delay, obsolete medical equipment and the lack of neonatal intensive care units were identified as the major factors for high mortality in neonates with gastrointestinal tract malformations in a developing country.

Keywords: Congenital malformations of the gastrointestinal tract, developing country, diagnostic delay, high mortality, newborn

Introduction

Congenital malformations are a major cause of neonatal morbidity and mortality, especially in developing countries. Gastrointestinal malformations (GIM) are structural or functional abnormalities that are evident from birth or from systematic examination in the delivery room.[1] GIM are the third-largest group of congenital anomalies after orthopaedic malformations and those of the central nervous system and account for 15% of all congenital anomalies.[2] Their prevalence varies between studies and countries and they are most often surgical emergencies.[3,4] In developed countries, the management has been dramatically improved due to antenatal diagnosis and advances in neonatal intensive care. This led to a major improvement in prognosis and reduced mortality from 50% to <10%.[5] In developing countries, the management of neonatal mortality faces many difficulties due to delayed diagnosis and inadequate technical support.[6,7] The lack of antenatal diagnosis, associated with diagnostic delay and inadequate neonatal intensive care explain the continuing high mortality in Senegal.[8] The aim of this study was to evaluate the overall management of GIM in neonates in the Paediatric Surgery Department of the Aristide Le Dantec University Hospital in Dakar to identify potential areas of improvement.

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Patients and Methods

A retrospective and descriptive study of GIM in neonates was conducted for 5 years, from 1st January 1, 2014 to 31st December 31 2018, at the Department of Pediatric Surgery and the Department of Anaesthesiology and Critical Care of the Aristide Le Dantec University Hospital in Dakar, Senegal. All cases of diagnosed GIM in newborns aged 1 to 28 days were included. Fifty-five patients with incomplete medical records were excluded. Data were obtained from medical records, antenatal history and surgical reports. The following parameters were collected: frequency, incidence, age, sex, birth weight, mode of transport, antenatal data (maternal age, antenatal ultrasound and infectious serology), time to diagnosis, type of malformations, associated pathologies, time to surgery, morbidity and mortality. The data were processed using Microsoft Excel 2010 (Microsoft Corporation, USA) and the statistical analysis was performed using Epi Info 7 software (CDC, USA).

Results

During the study period, 405 newborns with congenital anomalies were admitted to our hospital. Out of those, 126 suffered from GIM, which is equivalent to an incidence of 25.2 cases a year and a proportion of 31.1% of all congenital anomalies. The sex distribution was 74 (58.7%) boys and 52 (41.3%) girls and the sex ratio was 1.24. The mean age at diagnosis was 7.4 ± 3.2 days (range: 1–28). 14 newborns (11.1%) were preterm infants. The average birth weight was 2581g ± 533 (range: 1000–4450). Most newborns were transported to our hospital in a private vehicle (n = 116, 91.2%) and only 10 (7.9%) were transported by ambulance. The average maternal age was 28.7 ± 3.6 years. Six mothers were younger than 20 years (4.8%) and five were older than 40 (3.9%). Parental inbreeding was observed in 52 patients (41%). Antenatal misuse of tobacco or alcohol consumption concerned 5.5% of the patients. Antenatal serology tests for HIV, hepatitis, syphilis and toxoplasmosis were performed in 100 mothers (79.4%) and all of them were negative. Obstetrical ultrasound was performed in 67 cases (53.2%). Only two newborns in total (1.59%) were prenatally diagnosed with GIM. One was oesophageal atresia and one was intestinal atresia. The mean time to post-natal diagnosis was 6.5 ± 2.1 days (range: 1–28). Oesophageal atresia was the most common GIM. Associated with congenital heart disease and urogenital malformations were 12 (9.5%) and 14 (1.6%) of GIM, respectively.

Out of the 126 cases, 77 (61.1%) received surgery [Table 1] and 49 (38.9%) died before surgical exploration. The main causes of pre-operative death were intricate and dominated by lung infections (42.9%), gastrointestinal perforation peritonitis (32.6%), enterocolitis (16.3%) and hydro-electrolytic disorders (8.2%). The average time from

Table 1: The performed surgical procedures (open surgery)

Pathology	Surgical procedure	Amount (%)
Oesophageal atresia	Tracheoesophageal fistula repair and oesophageal anastomosis	21 (27.2)
	Delayed primary closure with primary gastrostomy	1 (1.3)
Anorectal malformations	Colostomy	27 (35.1)
	Y-V anoplasty	1 (1.3)
Hirschsprung's disease	Rectal biopsy	4 (5.2)
	Colostomy + rectal biopsy	6 (7.8)
Intestinal atresia	Ileostomy	5 (6.5)
Duodenal atresia	Duodenoduodenostomy	4 (5.2)
Hypertrophic pyloric stenosis	Extramucosal pyloromyotomy	4 (5.2)
Intestinal volvulus due to intestinal malrotation	Ladd procedure	2 (2.6)
Colonic atresia	Termino-terminal anastomosis	2 (2.6)
Total		77 (100)

Table 2: Mortality of each congenital gastrointestinal malformation

Pathology	Total	Preoperative mortality (%)	Postoperative mortality (%)	Total mortality (%)
Esophageal atresia	43	21 (48.3)	18 (41.9)	39 (90.7)
Anorectal malformations	36	8 (22.2)	10 (27.8)	18 (50)
Hirschsprung's disease	18	8 (44.4)	2 (11.1)	10 (55.5)
Intestinal atresia	12	7 (58.3)	3 (25)	10 (83.3)
Duodenal atresia	6	2 (33.3)	3 (50)	5 (83.3)
Colonic atresia	2	0	2 (100)	2 (100)
Intestinal volvulus due to intestinal malrotation	5	3 (60)	1 (20)	4 (80)
Hypertrophic pyloric stenosis	4	0	0	0
Total	126	49 (38.9)	39 (30.9)	88 (69.8)

admission to operation was 48 h (range: 24 h to 7 days). Temporary colostomy was the most performed surgical procedure in this study with 33 neonates (42.9%). Among the 77 newborns, who received surgery, 38 (%) had a simple post-operative course, 39 (50.6%) died. Post-operative deaths were related to anaesthetic complications (30.8%), lung infections (46.1%), sepsis (10.3%), enterocolitis (5.1%) and hydro-electrolytic disorders (7.7%).

Of the 126 newborns admitted, only 38 patients (30.2%) survived. Overall mortality was 69.8% (n = 88). All of the premature and newborns with congenital heart disease died. The main pathology leading to death was oesophageal atresia with specific mortality rate estimated to 90.7% [Table 2].

Discussion

The incidence of GIM found in our study is higher than that established by the WHO in 2010, which is 15% and varies by country.[1,9] Omid[3] explains these differences by the demographic characteristics of the populations and the specificities of pediatric surgical services depending on the country. Regarding the male predominance observed in newborns with GIM, we currently do not find an explanation for the male predominance.[3,10]

Prematurity and low birthweight are factors of poor prognosis.[9] However, in our series, prematurity only affects 11.1% of newborns. The evacuation of newborns must be ensured by class III medical transport.[11]

Maternal age over 35, certain maternal infections and exposure to certain medications and recreational drugs, including alcohol and tobacco, are factors that favour the onset of congenital malformations.[1,2,12] In our study, however, we do not find any correlation between these factors and the occurrence of these malformations. Only parental consanguinity is significantly high with a rate of 41% in our study. It is an important factor that can increase the risk of congenital anomalies. Its incidence in Senegal is high, but there are no studies correlating inbreeding and congenital malformations yet. Aloui's study showed a significant positive association between consanguinity and birth defects in the Tunisian population.[12]

The pre-natal diagnosis of congenital malformations has experienced a major boom in the last 20 years thanks to ultrasound and supplemented if necessary by fetal magnetic resonance imaging.[13-15] In our study, on the other hand, the rarity of this diagnostic method is explained by the insufficient training of specialists and adequate technical platform to detect organic congenital anomalies, especially digestive. It is also explained by the weak multidisciplinary collaboration between radiologists, surgeons and paediatricians. This contributes to the diagnostic delay observed in developing countries.[16-18] This diagnostic and surgical delay is linked to the absence of an antenatal diagnosis, to the ignorance of these pathologies by the nursing staff of the peripheral health structures and to the systematic evacuation of the majority of these digestive malformations in Dakar.[8,19] In this study, oesophageal atresia is the most common digestive malformation. The spectrum of types of neonatal malformations varies from one hospital structure to another, depending on the availability of antenatal and post-natal diagnostic means but also on different medical and surgical specialties. Often, oesophageal atresia, anorectal malformation and Hirschsprung's disease are the three most common digestive malformations.[5,16,20] Malformations associated with GIM are often factors of mortality.[7,13] The overall pre-operative mortality is 38.9% in this study. That specific to oesophageal atresia is estimated at 90.7%. In sub-Saharan Africa, the delay in surgical management is justified by the very deteriorated clinical condition of patients on admission requiring pre-operative resuscitation, the delay in a precise diagnosis and the poverty of the parents who must provide all the necessary care. medical expenses.[16,21] The causes of death in our patients are dominated by pneumonia, gastrointestinal perforations, enterocolitis and fluid and electrolyte disturbances. Regarding operated patients, the digestive stoma is the most performed surgical procedure in the series.[3,8] In this series, its proportion is 49.4%. It is an effective, low-cost waiting surgical procedure that can be carried out in peripheral health facilities, making it possible to improve the long-term prognosis and reduce the mortality of certain digestive anomalies with neonatal exposure. Operative and post-operative complications are also frequent in this series and remain dominated by pneumopathies, anaesthetic complications, septicemia, hydro-electrolyte disorders. Most of the mortality factors in our study are modifiable. This is to improve pre-natal diagnosis and shorten the time to diagnostic and therapeutic management. It is also about perfecting pre-operative and post-operative resuscitation as this is the main factor of mortality. These complications are identified as the factors of mortality in our patients.

Digestive malformations are the most common cause of death in newborns.[16] However, the figures vary from country to country.[20,22] In developing countries, mortality is still high, as this study illustrates. Ndour,[8] Gulimwentuga[9] Gbenou[23] identify factors of poor prognosis such as the insufficiency of qualified nursing staff, the lack of adequate diagnostic and therapeutic technical platform, the existence of undocumented subclinical malformations, the delay diagnosis, the parents' low level of education and home delivery.[8,9]

Conclusion

Congenital malformations of the digestive tract with neonatal revelation are frequent in our hospital. They are characterised by a very low pre-natal diagnosis and a delay in post-natal care. They are dominated by atresia of the oesophagus and anorectal malformations. Their mortality remains very high, especially for atresia of the oesophagus. Our results may help improve their prognosis in Senegal, by promoting antenatal diagnosis, early diagnostic and therapeutic management.

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Conflicts of interest

There are no conflicts of interest.

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