World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

Check for updates

A retrospective study: Risk factors and clinical presentation of neonatal surgical conditions

Rasha Sidahmed Elhassan Omar [1,*], Omer Saeed Magzoub [2] and Sahwa Eltahir Mohamed Omer [3]

[1] *Pediatric Specialist, SEHA, Abu-Dhabi, UAE.*
[2] *Specialist General Pediatric, Ain Al-Khaleej Hospital, UAE.*
[3] *Senior Pediatric Registrar, Sudan Medical Specialization Board, Sudan.*

World Journal of Advanced Research and Reviews, 2025, 25(01), 251-257

Publication history: Received on 22 November 2024; revised on 01 January 2025; accepted on 03 January 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.25.1.4058

Abstract

Background: Neonatal surgical conditions are a significant cause of morbidity and mortality in neonates. This study analyzed the socio-demographic characteristics, risk factors, types, and clinical presentation of surgical conditions of neonates admitted for surgical interventions.

Objectives: To evaluate the clinical presentation of neonatal surgical conditions, assess maternal health and birth risk factors, and identify prevalent surgical diagnoses.

Methods: This was a retrospective review of medical records of neonates admitted with surgical conditions at Khartoum Teaching Hospital and Ibrahim Malik Teaching Hospital from January 2020 to August 2022. Data collected included socio-demographic information, maternal health history, birth characteristics, symptom duration, and diagnosis.

Results: 114 neonates' medical records were reviewed. The majority (66, 57.9%) presented within the first week of life, with a male-to-female ratio of 1.2:1. Most neonates (87, 76.3%) were born to non-consanguineous couples, and 108 (94.7%) had no family history of similar conditions. Maternal comorbidities were rare 2 (1.8%). Birth weight distribution showed that 94 (82.5%) were of average weight. Congenital surgical conditions constituted 113 (99.1%) of cases, most cases were gastrointestinal 59 (51.8%), followed by CNS cases 23 (20.2%), abdominal wall defects 12 (10.5%), urological defects 8 (7%), respiratory cases 1 (0.9%), and other miscellaneous cases 11 (9.6%). Anorectal malformations constituted the most common gastrointestinal condition, accounting for 16 cases (14%), followed by Hirschsprung disease 13 (11.4%), jejunal atresia 11 (9.6%), and malrotation 9 (7.8%).

Conclusions: This study highlights the prevalence of congenital anomalies as the primary cause of neonatal surgical conditions, with gastrointestinal malformations being the most common. Early presentation within the first week of life and the absence of significant maternal or genetic risk factors were notable findings. Addressing the challenges of late diagnosis, inadequate prenatal screening, and resource limitations is essential for improving outcomes in neonatal surgical care.

Keywords: Risk factors; Clinical presentation; Surgical conditions; Neonates

* Corresponding author: Rasha Sidahmed Elhassan Omar

1. Introduction

The World Health Organization (WHO) defines a neonate as a child younger than 28 days, a period marked by the highest risk of mortality. Neonatal surgical conditions contribute to 11% of the Global Burden of Disease (GBD), with congenital anomalies representing most of these cases. Despite their prevalence and the fact that most of these conditions are surgically treatable, they are often inadequately addressed, highlighting a critical gap in their management [1].

Over the past 60 years, the developed world has seen remarkable advancements in managing neonatal surgical emergencies. These improvements are attributed to the availability of specialized surgical care, early diagnosis and intervention, advancements in anesthetic techniques, and enhanced diagnostic facilities. In contrast, outcomes remain poor in many developing countries due to limited resources and a shortage of trained personnel. The ability to deliver timely and effective surgical care in these regions is vital, not only for ensuring the immediate survival of newborns but also for promoting their long-term health and well-being [2].

The neonatal population accounts for a significant proportion of surgical admissions, placing a heavy burden on surgical units and healthcare facilities. Among the 20 countries with the highest neonatal mortality rates, 80% are in Sub-Saharan Africa. Leading causes include congenital anomalies, surgical infections, and trauma. Congenital abnormalities contribute to 7% of neonatal deaths, with nearly half being surgically treatable. Preventing and addressing neonatal surgical conditions early is critical to reducing childhood disease burden, as untreated cases often lead to disability or death [3].

Surgical conditions contribute significantly to neonatal mortality and place a considerable financial strain on healthcare systems. Despite ongoing efforts to reduce neonatal death rates, the preadmission health status of surgical neonates remains a critical determinant of outcomes, influencing both morbidity and mortality. However, there is a noticeable lack of research and data in the country regarding the factors that affect outcomes in neonatal surgery, which calls for further investigation and targeted improvements in clinical care [4].

This study is designed to examine the medical records of neonates admitted for surgical conditions throughout the study period. It will analyze socio-demographic data, maternal and birth histories, risk factors, and various surgical conditions to gain insights into the factors that affect surgical management in neonates. The results could guide the development of improved strategies for neonatal surgical care and outcomes.

2. Methodology

This is a descriptive, cross-sectional, hospital-based study. The research was conducted at Khartoum Teaching Hospital and Ibrahim Malik Teaching Hospital. The study was conducted from January 1, 2020, to August 31, 2022. The population comprised all neonates admitted to the hospitals during the study period. Neonates over 28 weeks gestational age and less than 28 days postnatal age with confirmed surgical diagnoses (established preoperatively, intraoperatively, or postoperatively) were included. Neonates with suspected but unproven surgical conditions, minor conditions such as abscesses or cellulitis, and incomplete hospital records were excluded. 114 neonates were included, with the limited number of cases attributed to referrals for cardiac conditions and respiratory cases not accepted due to mechanical ventilation unavailability. A convenience non-probability sampling method was employed.

2.1. Study Variables

- Independent Variables: Demographic data (age, gender)
- Dependent Variables: Maternal history, birth history, clinical presentation, and diagnosis.

2.2. Data Collection

A structured checklist is used to collect demographic and clinical data from hospital records. The researchers performed comprehensive assessments of presenting problems and associated abnormalities.

2.3. Data Management

Data was cleaned, entered in Microsoft Excel, and analyzed using SPSS version 24. Categorical data were presented as frequencies and proportions. Statistical significance was assessed using the chi-square and Fisher's exact tests for small sample sizes. A p-value of ≤0.05 was considered statistically significant. Results were presented in univariable tables and graphical formats.

2.4. Ethical Considerations

The study was approved by the ethics review committees of the Sudan Medical Specialization Board, the Council of Pediatric and Child Health, the research unit's ethics committee (EDC), and the Ministry of Health, Sudan. The study received authorization from the administrative authorities of both hospitals. To ensure confidentiality, participant information was anonymized using serial numbers.

3. Results

This study reviewed the medical records of neonates admitted with surgical conditions from January 2020 to August 2022. The results encompass socio-demographic data, maternal and birth histories, and clinical presentation of surgical conditions. 66 neonates were presented within 1 to 7 days of age, accounting for 57.9% of cases. Additionally, 21 (18.4%) presented between 8 and 15 days, 6 (5.3%) between 16 and 20 days, and 21 (18.4%) in the late neonatal period (21-28 days). Males comprised 62 (54.4%) of the total, while females were 52 (45.6%), resulting in a male-to-female ratio of 1.2:1 [Table 1].

Most neonates were from non-consanguineous marriages in 87 (76.3%), with no family history of similar surgical conditions in 108 (94.7%). There was no history of neonatal death in 108 cases (94.7%), and 97 neonates (85.1%) had no history of miscarriage. Most mothers attended regular antenatal care 87 (76.3%), with 110 (96.5%) having no antenatal diagnosis. Risk factors during pregnancy included 8 cases (7%) of polyhydramnios and 3 cases (2.6%) of oligohydramnios [Table 2]. Regarding maternal parity, half of the mothers (55.3%) were grand multipara (five or more children), while 44.7% had one to four children. Maternal medical comorbidities were observed in only 2 mothers (1.8%); one had diabetes mellitus, and another had hypertension.

Neonates' birth weight distribution showed that 94 (82.5%) were of average weight and 20 (17.5%) were low birth weight. In terms of gestational age, 2 neonates (1.8%) were post-term, 101 (88.6%) were full-term, 11 (9.6%) were preterm, 1 (0.9%) was extremely preterm, and 10 (8.8%) were late preterm. Vaginal deliveries accounted for 79 cases (69.3%), while 35 (30.7%) were delivered via cesarean section. Additionally, 51 neonates (44.7%) were delivered at home and 63 (55.3%) in a hospital. Only 9 neonates (7.9%) exhibited dysmorphic features [Table 3].

Symptom duration was categorized as follows: 68 neonates (59.6%) had symptoms lasting 1-3 days, 20 (17.5%) for 4-7 days, and 26 (22.8%) for more than seven days. In terms of diagnosis, most cases were gastrointestinal 59 (51.8%), followed by CNS cases 23 (20.2%), abdominal wall defects 12 (10.5%), urological defects 8 (7%), respiratory cases 1 (0.9%), and other miscellaneous cases 11 (9.6%) [Table4]. Anorectal malformations constituted the most common gastrointestinal condition, accounting for 16 cases (14%), followed by Hirschsprung disease 13 (11.4%), jejunal atresia 11 (9.6%), and malrotation 9 (7.8%). [Figure 1].

Table 1 Distribution according to socio-demographic data, n=114

		N (%)
Age	1-7 days	66 (57.9%)
	8-15 days	21 (18.4%)
	16-20 days	6 (5.3%)
	21-28 days	21 (18.4%)
Gender	Female	52 (45.6%)
	Male	62 (54.4%)

Table 2 Distribution according to maternal history, n=114

	Yes	**No**
ANC	87 (76.3%)	27 (23.7%)
Miscarriage	17 (14.9%)	7 (85.1%)
Neonatal death	6 (5.3%)	108 (94.7%)
Consanguinity	27 (23.7%)	87 (76.3%)
Similar condition	6 (5.3%)	108 (94.7%)
Polyhydramnios	8 (7.0%)	106 (93.0%)
Oligohydramnios	3 (2.6%)	111 (97.4%)
ANC diagnosis	4 (3.5%)	110 (96.5%)

Table 3 Distribution according to birth history, n-114

		N (%)
Birth weight	Average weight	94 (82.5%)
	Low birth weight	20 (17.5%)
Gestational age	<40 weeks	2 (1.8%)
	37-40 weeks	101 (88.6%)
	> 37-32 weeks	10 (8.8%)
	> 32-28 weeks	1 (0.9%0
Mode of delivery	NVD	79 (69.3%)
	CS	35 (30.7%)
Place of delivery	At home	51 (44.7%)
	At hospital	63 (55.3%)
Dysmorphic features	Yes	9 (7.9%)
	No	105 (92.1%)

Table 4 Distribution of Cases by Category

Category	**Number of Cases**	**Percentage (%)**
Gastrointestinal	59	51.8
Central Nervous System (CNS)	23	20.2
Abdominal Wall Defects	12	10.5
Urological Defects	8	7.0
Respiratory Cases	1	0.9
Other Miscellaneous Cases	11	9.6
Total	114	100%

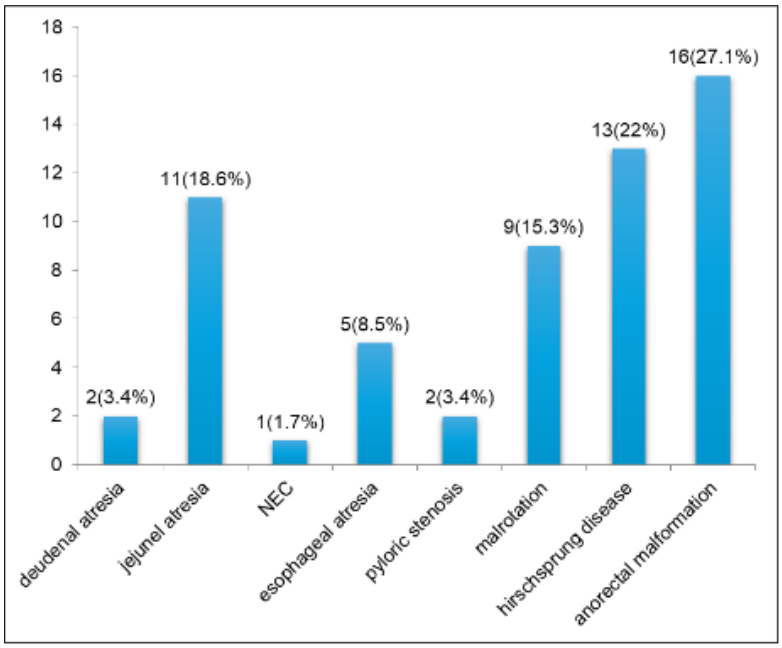

Figure 1 Distribution according to *gastrointestinal conditions, n=59*

4. Discussion

This study provides valuable insights into the risk factors and clinical presentation of neonates admitted with surgical conditions over the study period. A notable finding is that most cases were presented within the first week of life, which aligns with existing literature indicating that many surgical conditions in neonates manifest shortly after birth [1]. The male-to-female ratio 1.2:1 is consistent with epidemiological studies reporting a higher prevalence of surgical anomalies among male neonates [5], but other studies found equal sex distribution [6]. The predominance of non-consanguineous marriages among most neonates (76.3%) suggests that genetic factors may play a less significant role in the etiology of the observed surgical conditions. This finding is supported by research indicating a lower incidence of congenital anomalies in non-consanguineous unions [5]. Furthermore, the lack of a family history of similar conditions (94.7%) highlights the sporadic nature of these anomalies within this cohort.

The birth weight distribution is reassuring, with 82.5% of neonates classified as average weight. Low birth weight is often associated with adverse outcomes in surgical populations [7,8]. The gestational age data also support this trend, as 88.6% of neonates were full-term. This aligns with literature that suggests better outcomes for full-term neonates undergoing surgery [4].

The high rate of vaginal deliveries (69.3%) and a significant proportion of home births (44.7%) raise important considerations regarding access to healthcare and the quality of antenatal care. The finding that 100 (96.5%) of mothers did not receive antenatal diagnosis indicates a gap in prenatal screening that could potentially improve outcomes for neonates with surgical conditions. Reducing mortality and improving outcomes for surgical neonates in developing countries require early antenatal diagnosis and referral, advancements in surgical techniques and technologies, sufficient staffing and post-operative care, and greater investment in establishing neonatal surgery as a subspecialty [9,10].

Most surgical conditions (99.1%) were congenital, aligning with the established understanding that congenital anomalies represent a significant burden in neonatal surgery. Gastrointestinal anomalies were the most prevalent, particularly anorectal malformations and Hirschsprung disease, corroborating findings from other studies highlighting these conditions as leading causes for surgical intervention in neonates [7,8,9,11].

In our study, (59.6%) experienced symptoms lasting between 1 and 3 days, significantly affecting survival outcomes. Similarly, at the Nnamdi Azikiwe University Teaching Hospital in Nnewi, Southeast Nigeria, 76.9% of patients were reported to present late. Comparable findings have been observed in other developing countries; for instance, Tenge-Kuremu et al in Kenya documented a median presentation time of 3 days, while Samuel Chidi Ekpemo in Yaoundé, Cameroon, reported an average delay of 3.7 days [12,13].

In our study, gastrointestinal cases were the most prevalent (59 cases, 51.8%), followed by central nervous system (CNS) cases (23 cases, 20.2%), abdominal wall defects (12 cases, 10.5%), urological defects (8 cases, 7%), respiratory cases (1 case, 0.9%), and miscellaneous conditions (11 cases, 9.6%). Among gastrointestinal conditions, anorectal malformations were the most frequent, accounting for 16 cases (14%), followed by Hirschsprung's disease (13 cases, 11.4%), jejunal atresia (11 cases, 9.6%), and malrotation (9 cases, 7.8%). This aligns with findings by Rosemary O. Ugwu and Philemon E. Okoro, who reported that gastrointestinal tract conditions are newborns' most common surgical issues, as observed in this and other studies. Similarly, the most frequent congenital abnormalities requiring surgical intervention were anorectal malformations, small intestinal obstructions, neural tube defects, and omphalocele, consistent with findings from other research [9].

Statistical associations between weight, surgical intervention, and antenatal diagnosis highlight the necessity for comprehensive prenatal care and monitoring, as these factors could significantly influence neonatal survival rates.

Limitations

- Sample Size: The study included a limited number of neonates (114), which may affect the generalizability of the findings to broader populations.
- Retrospective Data: The reliance on medical records may introduce biases or inaccuracies in the data collected, affecting the reliability of the results

5. Conclusion

This study underscores the burden and complexity of neonatal surgical conditions in resource-limited settings. The findings reveal a significant prevalence of congenital anomalies, particularly gastrointestinal malformations like anorectal anomalies and Hirschsprung's disease. Late presentation and lack of prenatal diagnosis emerge as critical challenges, directly impacting neonatal survival rates. Improving outcomes necessitates early antenatal detection, timely referrals, and investment in neonatal surgical infrastructure and expertise. Strengthening healthcare systems to address these gaps could significantly enhance survival and quality of care for neonates with surgical conditions.

Recommendations

- Enhance Antenatal Care: Implement early screening for congenital anomalies.
- Improve Healthcare Access: Increase awareness and access to maternal healthcare, especially in underserved areas.
- Strengthen Provider Training: Offer ongoing education on neonatal surgical conditions.
- Encourage Research: Support studies on neonatal surgical conditions and their epidemiology

Compliance with ethical standards

Acknowledgments

The researchers funded this study independently.

Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Kasede M Ikol, Peter W Saula, Peter Gisore, Everlyne Mvungu, Henry R Mwangi, Outcomes of Neonates Requiring Surgical Interventions in Eldoret, Ann Afr Surg. 2019; 16 (1):20–25. DOI: http://dx.doi.org/10.4314/aas.v16il.5

[2] Adamu S, Wabada S, Abubakar AM, Jalo I, Faruq SA, Nwosu C, et al. Determinants of outcome of neonatal surgical emergencies in Gombe: a 3-year retrospective review. Ann Ibd Pg Med. 2024;22(1):47–50.

[3] Abdalla AR, Karsani SHA. Pattern of neonatal surgical presentation and outcome in Sinnar Hospital. Glob J Med Res Surg Cardiovasc Syst. 2014;14(4):1–6.

[4] Mohta A, Mishra A, Khan NA, et al. Evaluation of Risk Factors Affecting Outcome in Outborn Surgical Neonates. *J* Indian Assoc Pediatr Surg. 2021;26(5):307-310. doi: 10.4103/jiaps.JIAPS_149_20

[5] Faraja Mussa Magwesela, Happiness Rabiel, Catherine Mlelwa Mung'ong'o - Pattern of congenital anomalies among pediatric surgical patients in a tertiary care hospital in northern Tanzania: World Journal of Pediatric Surgery 2022;5: e000410.

[6] Saula, P., Kikuvi, G., Kombe, Y. et al. Changing the outcomes of newborns with surgical conditions at a tertiary-level hospital in Kenya: a cluster randomized trial. Ann Pediatr Surg 18, 79 (2022). https://doi.org/10.1186/s43159-022-00217-9

[7] Dicko-Traoré F. Neonatal surgical emergencies in Gabriel Touré Teaching Hospital in Bamako: epidemiological and clinical aspects. Pediatrics & Neonatal Biology Open Access. 2019;4. doi:10.23880/PNBOA-16000133.

[8] Sharma S, Laddha A, Shukla K. A retrospective (2004-2013) and prospective (2014-2015) audit of surgical diseases of newborn with special reference to gastro-intestinal diseases and emergencies over a period of 10 years at a tertiary care centre. International Surgery Journal. 2016; doi:10.18203/2349-2902.isj20160662.

[9] Ugwu RO, Okoro PE. Pattern, outcome, and challenges of neonatal surgical cases in a tertiary teaching hospital. Afr J Paediatr Surg. 2013;10(3):226-30. doi:10.4103/0189-6725.120886.

[10] Ekwunife HO, Ameh E, Abdur-Rahman L, Ademuyiwa A, Akpanudo E, Alakaloko F. Burden and outcome of neonatal surgical conditions in Nigeria: A countrywide multicenter cohort study. J Neonatal Surg. 2022 Jan.9.5]; 11:3. doi.org/10.47338/jns. v11.1029

[11] Prashanth Madapura Virupakshappa, Nidhi Rajendra, Burden and spectrum of neonatal surgical diseases in a tertiary hospital: a decade experience, Int J Contemp Pediatr. 2018 May;5(3):798-803, doi.org/10.18203/2349-3291.ijcp20181386

[12] Tenge-Kuremu R, Kituyi PW, Tenge CN, Kerubo J. Neonatal surgical emergencies at Moi Teaching and Referral Hospital in Eldoret - Kenya. East Cent Afr J Surg. 2007;12(2):36-39.

[13] Samuel Chidi Ekpemo, Ndubuisi Eleweke, Nneka Okoronkwo, Chapp-Jumbo Assumpta. Challenges and Outcome of Neonatal Surgery at the Abia State University Teaching Hospital Aba Nigeria. American Journal of Biomedical and Life Sciences. Vol. 6, No. 4, 2018, pp. 69-72. doi: 0.11648/j.ajbls.20180604.11