

Retrospective pattern study of pediatric surgical conditions outcome in a tertiary care center

Abstract

Aim: To observe the incidence and outcome of pediatric surgical conditions in a tertiary care center.

Method: A retrospective observational study was conducted at Motherhood Chaitanya hospital between January, 2018 to December, 2021 and 118 patients requiring surgery were enrolled during the time frame. These cases were divided into congenital and acquired conditions. Incidence of various surgical conditions in different age groups has been observed. The comparison was made as to which condition is predominantly common in the center. Length of hospital stay was taken into consideration and time taken to initiate enteral feeds and reach full feeds was studied in gastrointestinal (GI) cases. The outcome of 118 cases has been assessed in the form of discharge or death.

Results: In this study, a total of 118 patients were enrolled over the specified age time frame from birth to 16 years. The majority of the cases were males and the male to female ratio of 2.8:1. 32.2% of the cases were between 4 to 13 years, the age group most commonly affected. 80 cases accounted for congenital anomalies with inguinal hernia being the most common (18.75%). 31.5% were abscesses requiring drainage among acquired conditions. 50% of total cases were gastrointestinal cases with inguinal hernia having a maximum incidence (25.4%). 32.2% of cases had a hospital stay of 24 to 48 hours. Time taken to initiate feeds was 1.5 days in GI surgeries. Mortality of 2.5% has been observed in this study.

Conclusion: Pediatric surgery conditions pose a major health and economic burden to the community so they must be timely identified and treated.

Keywords: pediatric, neonatal, surgical conditions, outcomes

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Introduction

There are surgical conditions in paediatrics which require immediate attention and proper surgical care to prevent mortality and morbidity.^{1,2} There are broad categories of pediatric surgical conditions differing in socio-demography, age and time concerning incidence. Low and middle-income countries pose a heavy burden of pediatric surgical conditions, with about five billion people not having access to surgical care when needed and the pediatric age group is equally affected.²⁻⁴ While the children are in the years of critical development, pediatric surgical conditions have the risk of life-long morbidity and mortality.⁵ Hence, children of a country represent a population with critical and specific surgical needs which include anaesthetic, perioperative, and postoperative capacity requirements. WHO's 63rd Health Assembly report says that 3,03,000 newborns die within four weeks of life worldwide because of congenital anomalies.⁶ Apart from being the cause of death, these congenital conditions lead to long-term disabilities affecting individuals, families, health system and society.² Diagnosis and management of congenital abnormalities underwent a significant breakthrough in the last 50 years.^{7,8} The truly complex abnormalities are now treated with the success of up to 90%.⁷ Nowadays, congenital anomalies requiring surgery are diagnosed antenatally so that delivery is conducted in specialized centres with a neonatal surgical management team. If the accessibility and quality of paediatric surgical care in lower and middle income countries are improved, there is potential to substantially reduce mortality and long-term disability among the children.^{7,8}

Materials and methods

This retrospective observational study had been conducted at

Motherhood Chaitanya hospital, Chandigarh from January, 2018 to December, 2021. The study was approved by an Institutional Ethics Committee. A total of 118 patients whose age varies from birth to 16 years, and were under the care of a paediatric surgeon, were included in the study after consent from their parents. Follow-up was done from the time of admission to discharge. The information was recorded in the prescribed set proforma. Demographic profiles of the patients, the age group and gender were recorded. Clinical presentation of the patients, the condition is acquired or a congenital disorder, along with the final diagnosis details was recorded. The surgical conditions were divided into congenital and acquired ones and the incidence of each surgical condition was calculated. The division was made between various age groups and incidence in the particular age group was seen. Duration of their hospital stay and time to initiate enteral feeds post operational mode were observed. Outcomes were assessed in the form of discharge or death.

Statistical analysis

The data so collected was studied in Microsoft Excel software. Data were analysed in the form of percentages. The median was calculated for nominal variables using MS excel.

Results

All 118 patients enrolled from birth to 16 years of age during the study period underwent surgery. Among the total number of patients, 73.7% were males and 26.3% were females.

The distribution of patients according to age groups has been presented in Table 1. It had been observed that the largest number of admissions were in the age group of 4-13 years (32.2%) followed by 1

to 4 years (27.9%). Out of 118 patients, eighty (67.7%) had congenital causes of paediatric surgery conditions and thirty-eight (32.2%) had acquired causes.

Table 1 Distribution of patients according to age group (n=118)

Age Group	Patients	Percentage (%)
0 < age ≤ 28days	27	22.8
29 days ≤ age < one year	19	16.1
1 ≤ age < 4 years	33	27.9
4 ≤ age < 13 years	38	32.2
13 ≤ age < 16 years	1	0.8

Among the congenital conditions in Table 2 for eighty surgical admissions, fifteen cases (18.75%) were of inguinal hernia which was the most common; the second most common being undescended testis (11.25%). Anorectal malformation and anovestibular fistula accounted for 6.2% each of congenital causes. In the congenital group of cases, about 3.75% were of pyloric stenosis, tongue tie, phimosis, Ileal/Jejunal atresia, meningomyelocele and trachea oesophageal fistula each. Others included Sacrococcygeal teratoma (1.25%), eventration of diaphragm (2.5%), posterior urethral valve (2.5%), cleft palate (1.25%).

Table 2 Congenital causes with paediatric surgical admissions (n=80)

Diagnosis	Admissions	Percentage (%)
Tracheo oesophageal fistula	3	3.75
Eventration of diaphragm	2	2.5
Hydrouretronephrosis	1	1.25
Congenital hernia of the cord	2	2.5
Posterior urethral valve	2	2.5
Hirschsprung disease	4	5
Anorectal malformation	5	6.2
Inguinal hernia	15	18.75
Undescended testis	9	11.25
Pyloric stenosis	3	3.75
Cleft palate	1	1.25
Hydrocele	4	5
Tongue tie	3	3.75
Rectal polyp	2	2.5
Hypospadias	6	7.5
Anovestibular fistula	5	6.2
Meatal stenosis	1	1.25
Phimosis	3	3.75
Sacrococcygeal teratoma	1	1.25
Multicystic dysplastic kidney (MCDK)	1	1.25
Atresia Ileal/Jejunal	3	3.75
Meningomyelocele	3	3.75
Mesenteric cyst	1	1.25

The observations reported in Table 3 concluded that the acquired causes of paediatric surgery admissions were 38 out of 118 (32.2%) out of which twenty-one cases were infective, twelve (31.5%) were abscess and nine (23.6%) of appendicitis. Other cases were related to NEC/perforation (15.7%), hydrocephalus (7.8%) and intussusception (15.7%). There was only one case each of trauma and haemorrhoids respectively.

Table 3 Acquired causes of paediatric surgery admissions: (n=38)

Diagnosis	No. of admissions	Percentage (%)
Necrotizing enterocolitis (NEC)/ Perforation	6	15.7
Hydrocephalus	3	7.8
Intussusception	6	15.7
Abscess	12	31.5
Appendicitis	9	23.6
Haemorrhoids	1	2.6
Trauma	1	2.6

The distribution of causes of gastrointestinal cases has been presented in Figure 1. Out of a total of 118 patients, half of the cases i.e. 59 were gastrointestinal cases. 25.4% of the total GI cases were of inguinal hernia which was the most commonly observed among GI infections. The second most common gastrointestinal case was about 15.7%, were of appendicitis, whereas 10.1% of cases were each of intussusception and NEC respectively. Anorectal malformation was observed in five cases (8.4%) cases. Hirschsprung disease accounted for 6.7% of cases among GI cases that required surgery. There were three cases (5.08%) each of tracheoesophageal fistula, ileal/jejunal atresia and pyloric stenosis respectively. Two cases (3.38%) of congenital hernia of the cord were observed. Further, in one case (1.6%) each mesenteric cyst, haemorrhoids and cleft palate were operated on in the hospital.

Distribution of Gastrointestinal cases

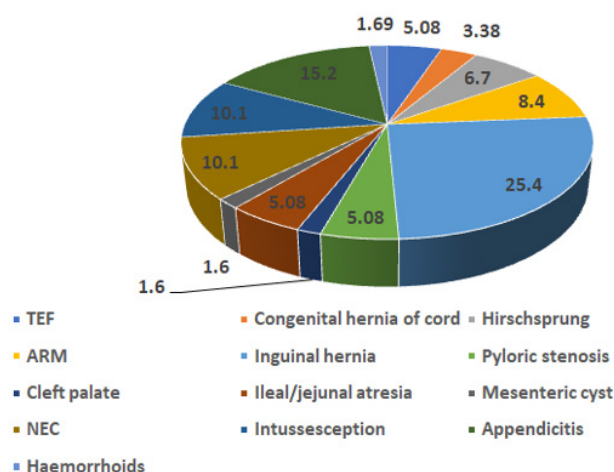


Figure 1 Gastrointestinal causes of paediatric surgery cases (n=59).

It was concluded from Table 4 that 32.2% of the admitted cases had a hospital stay of 24-48 hours followed by 27.1% of cases with a stay of three to seven days. 22.8% of the cases had a stay of fewer than twenty-four hours and only 5.08% of cases had more than fourteen days of hospital stay.

Table 4 Duration of Hospital Stay

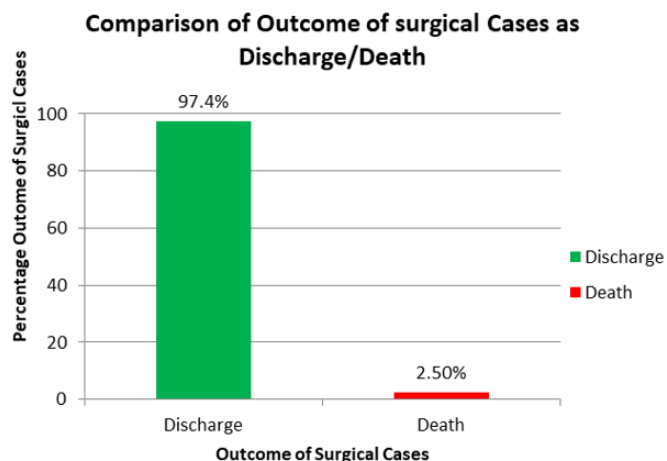
Duration in hours/days	Number of patients	Percentage (%)
Less than 24 hours	27	22.8
24 to 48 hours	38	32.2
3 to 7 days	32	27.1
8 to 14 days	15	12.7
More than 14 days	6	5.08

According to Table 5, the median time to initiate feeds in GI surgeries was 1.5 days and the time to reach full feeds was 7.5 days post-operation.

Table 5 Observations for a time of feeds in neonatal GI surgeries:

Time of feed	Median (days)
Time for initiating feeds (Post op day)	1.5
Time to reach full feeds (Post op day)	7.5

The outcome of surgical cases shown in Figure 2 concluded that nearly 97.4% of the admitted cases were discharged. Three deaths were reported (2.5%) among paediatric surgery patients during the frame of the study. Out of three deaths, two died due to septicaemia and refractory shock after NEC perforation. One patient died due to respiratory failure and septicaemia after being operated on for trachea oesophageal fistula.

**Figure 2** Outcomes of surgical cases (n=118) in form of discharge/ death.

Discussion

Paediatric-surgical conditions are quite common in developing countries, however inappropriate care results in life-long disabilities and deaths.² Primary care can only be fruitful if a timely referral is done after stabilizing the patient for the effective surgical treatment. Children have different surgical conditions and each may face specific anaesthetic challenge.²

In the current study at Motherhood Chaitanya hospital, 118 patients were enrolled in a time frame of three years and male to female ratio was observed to be 2.8. This may be due to male preference for treatment in a private hospital in India. Male predominance had been reported in other studies carried out in Somaliland and Uganda.^{9,10} This may be due to a large number of patients (14.4%) admitted with male genitourinary problems. Similar findings were reported by Doumi et al.¹¹ as well.

In this presented scenario, 27 cases out of 118 surgical cases were neonatal surgeries (22.8%). A study from the government hospital in Kathmandu, Nepal showed 205 neonatal surgeries in two years.¹² Studies from India reported nearly a thousand neonatal surgeries in three years and Rwanda showed nearly seventy five such surgeries in one year.^{13,14}

In this study, nearly 27.9% surgical cases belong to the age group between one to four years. In comparison to a study done in Cairo in which age ranged between a few hours and twelve years with a mean age of 11.7 months.¹⁵ has been reported.

Further, it had been observed that the 67.7% of surgical conditions were congenital. Maximum cases of inguinal hernia (18.75%) were reported followed by 11.25% of undescended testis. Doumi et al.¹¹

also concluded that congenital anomalies accounted for 40% of the total surgical cases with maximum cases of inguinal hernia. Fazle Mubarak Bari et al.¹⁶ carried out a study in Dhaka where gastric intestinal tract (GIT) had been reported for a nearly 27% of the cases, followed by the nervous system. Taksande et al.¹⁷ concluded that cardiovascular malformations were most common. In a study by Pathak S. et al.¹⁸, congenital anomalies were the commonest causes of admission, amounting to 65.35% of considered cases. Arushi Agarwal et al.¹⁹ found that the most common anomalies were neural tube defects (NTD) of about 24.3%, followed by anorectal malformation (ARM) in 20.7% of cases, and then tetralogy of Fallot (TOF) in 20% cases. Further, it had been reported that males were affected more than females. Among the acquired cases 31.5% of surgical cases were reported with an abscess in our centre followed by 23.6% cases of appendicitis. Abscesses need incision and drainage and minor procedures which involve minimal hospital stay are mostly completed in our centres. In addition, appendicitis is easily diagnosed and is operated on laparoscopically in the majority of cases. In the Yirgalem study by Tekle TT, et al.²⁰, the leading cause of admission was found to be intussusceptions in 14.1% of the considered cases.²⁰ The difference in the two studies was due to the different capacities of hospitals for service provisions. A similar finding following our study was observed in other studies carried out in Africa which showed among skin and soft tissue injury abscesses, pyomyositis was more common.²

Only one case of trauma was operated on in our centre due to a lack of availability of neurosurgeons, as most trauma cases involve head injuries. There was another observation done among gastrointestinal cases. According to our study, 25.4% of GI cases were of inguinal hernia followed by appendicitis, intussusception, NEC and anorectal malformations. About 40.9% of cases with gastrointestinal causes were the most common cause of pediatric surgical admission. The commonest being inguinal hernia in 18.11% of cases in a study by Pathak S, et al.¹⁸ A study from Ethiopia showed that among gastrointestinal conditions appendicitis was the most common cause followed by infantile pyloric stenosis.²¹ Derbew et al.²² also had similar findings with gastrointestinal cases being most common with appendicitis as a leading cause of the surgical condition.

In the presented study maximum cases of about 32.2% had hospital stays between 24-48 hours followed by nearly 27.1% cases with a hospital stay of 3-7 days. In a study by Temesgen Firomsa., et al.²⁴ the average length of hospital stay is 4.3 days.²⁴ Also study by Peiffer et al.²⁵ to determine predictors of poor postoperative outcome length of hospital stay was about 3.0 days. J.S. Karpelowsky et al.²⁶ concluded that the median length of hospital stay was 4 days (interquartile range, 2-14 days) in HIV-infected children undergoing surgery. In most of the studies, the most common surgeries are inguinal hernia or small GI surgeries which are discharged within 2-3 days. Prolonged hospital stays have seen only cases with complications and mortality.

GI surgeries in neonates were considered in our study and the median time to initiate feeds were 1.5 days and the time to reach maximum feeds were 7.5 days to post-operation. In various studies, Early enteral feeding (EEN), was defined as ranging from eight hours to five days. The earliest was Ekingen,²⁷ whereas feeding in the EEN group was started between eight and twenty hours post-operatively, with a mean of twelve hours. Davila -Perez's²⁸ study stated EEN as any time before postoperative day 5, with a minimum interval of 24 hours. Jensen²⁹ was the only gastrostomy study which reported time to full enteral feeding. In laparoscopic the median time to reach full feeds was 17.4 hours in comparison to 58.3 hours in open surgeries. Davila-Perez's²⁸ and Yadav³⁰ studied EEN following intestinal anastomosis

both showed a significantly lesser time to reach full feeds of the order of 62.3 hours in comparison to 196 hours in the EEN group.

In the presented study, 97.4% of patients were discharged with mortality rates of 2.5% and all patients died of GI surgery complicated with sepsis. 1.7% of deaths occurred in Ghana in the study presented by Peiffer et al.²⁵ Sowande et al.³¹ had reported that sepsis was the most common complication and resulted in the worst outcome with a mortality rate of 53.6%. Pignaton et al.³² related to age and mortality and found that patients of age less than one year have higher rates of mortality in comparison to higher age groups.

Hospital admission data may be quite helpful to assess the epidemiology of a disease within population. The results of the presented study help us to understand the surgical conditions affecting children in the community. Considerable progress can be made if we realise the flaws in identifying and curing these paediatric surgical conditions and making it a priority to include them in national health programs.²³ The challenge is to deliver effective paediatric surgical facilities in the form of a paediatric surgeon, and experienced anaesthetist and provide sufficient resources to bear the brunt of these surgical diseases.

Limitations

This study was conducted on the surgical admissions in a tertiary care hospital and the true burden of paediatric surgery problems in the community could not be assessed. It needs a large community-based study to estimate the burden of acquired and congenital paediatric surgical problems more accurately.

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Conflicts of interest

No conflict of interest exists.

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