

Original Research Article

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Clinical profile and outcome of pediatric surgical patients in a rural tertiary centre

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ABSTRACT

Background: Pediatric surgery is a sub-specialty involving the surgery of foetuses, infants, children and adolescents. Congenital malformations, trauma and childhood cancers are their three major concerns requiring the focus of their attention. Rural pediatric population in India still remains devoid of such facilities. Little is factually known about the burden of surgical disease globally. Surgical treatment is an essential component of basic medical care and an important means of providing preventive and curative therapy. Pediatrician has a significant role in caring for surgical patients. There is a need to know the spectrum of diseases that warrant admission into the pediatric surgical units. Current study was conducted to find out the clinical profile and immediate outcome of the various pediatric surgical conditions.

Methods: This prospective observational study was conducted at Vadodara. All the patients 0-18 years, with surgical condition were enrolled in the study. Patients were followed from the time of admission to discharge. All the clinical data from admission to discharge were recorded and analyzed.

Results: Total 127 (3%) patients were enrolled in the study. Males were 93 (73.2%). One to 5 years 45 (35.4%) was the largest age group followed by infants 23 (18.1%). Largest number of patients were from Gastro Intestinal Condition 52 (40.9%) and congenital causes forms 83 (65.35%) of admissions. Commonest congenital anomaly was inguinal hernia 23 (27.7%). Complications were recorded in 46 (36.22%) patients. The average duration of stay was 7.7 days. The 124 patients were discharged successfully.

Conclusions: Surgical conditions are important part of pediatric and neonatal care. Management of congenital surgical condition is important to decrease infant and under five mortality and other comorbidities as well.

Keywords: Congenital malformations, Infants and neonates, Post-surgical complications

INTRODUCTION

Pediatric surgery is a sub-specialty involving the Surgery of foetuses, infants, children, adolescents, and young adults. Pediatric surgery as a subspecialty arose in the middle of the 20th century as the surgical the surgical care of birth defects required novel techniques and methods.¹ In many developed nations pediatric surgery is

very well developed and recognized as an important subspecialty contributing to improve the child health delivery system and reducing the neonatal and infant mortality rates. Congenital malformations, trauma and childhood cancers are their three major concerns requiring the focus of their attention.¹ The large rural pediatric population still remains devoid of such facilities.

Little is factually known about the burden of surgical disease and less is known about global surgical provision of care for diseases that may be treated, cured, or palliated by a surgical intervention. Despite the lack of information, surgical interventions are provided by a variety of agencies every day in the developing world.³

For many decades in the developing countries, general surgeons were doing a great job especially in rural areas in handling planned and emergencies related to pediatric surgical problems. Surgeons are trained in their postgraduate courses to handle pediatric surgical conditions as most of the time and places pediatric surgeons are not available.⁴ They deserve to take a pride in their achievements, but also a need is felt to define referral criteria to different sub specialties.

As the population grows, the burden of disease will also grow. There is a need to plan for establishment of more health services in the future in relation to existing diseases. Surgical treatment is an essential component of basic medical care and an important means of providing preventive and curative therapy.⁴

Various subdivisions of pediatric surgery like pediatric urology, thoracic surgery, neuro surgery, GI surgery, plastic surgery, traumatology, oncology, and neonatal surgery have also been developed in various countries recently. In last decade a lot of research has been made in fetal therapy, organ transplantation, pediatric laparoscopy, endoscopy, laser therapy, gene therapy. Newer advancement in the field of radiology and genetics have increased the detection rate of congenital malformations and acquired surgical conditions.

The pediatrician has a significant role in caring for surgical patients and assisting in their peri-operative management. This becomes even more important in situations where the surgical unit for children is housed within the pediatric ward.⁵ There is a need to know the spectrum of diseases that warrant admission into the pediatric surgical units. Children who need surgical intervention are present at all levels of health care.

There are many problems existing at community level, at hospital level while executing surgical care to children. These problems range from lack of awareness and late presentation due to poor transportation and lack of available child health services; it is quite possible that a large number of new born with congenital malformations may die through shortage of trained personnel, lack of logistic support to poor financing. Many of the affected neonates and infants have disadvantage due to illiterate parents, low birth weight, perinatal infections, prematurity, poor obstetric care and complete absence of foetal therapy.¹ The introduction of 108 emergency ambulance service in NRHM program has been proved a boon in cases of fatal accidents, various surgical emergencies. This has definitely contributed to improved outcomes especially in emergent situations. Keeping

above facts in mind, current study was planned with aim to find out the clinical profile and immediate outcome of the various Pediatric Surgical conditions at Dhiraj hospital, Piparia.

METHODS

This prospective observational study was conducted at Dhiraj hospital, Piparia, Vadodara, from January 2013 to June 2014. Study was approved from Sumandeep Vidyapeeth institutional ethics committee. All the patients from the birth to 18 years, who were under the care of pediatric surgeon, were enrolled in the study after consent/assent from the patients/parents. Patients were followed from the time of admission to discharge. Those Patients who took DAMA were excluded from the study. The information was recorded in the set proforma.

Demographic profile of the patients including age distribution, and gender were recorded. Clinical presentation of the patients including the system involved, whether acquired condition or congenital disorder, their final diagnosis, operative procedure or conservative management done, associated co-morbid conditions, post operative complications, duration of stay, revision surgeries if any were recorded. Outcome was recorded as discharge or death. The complications that occurred during the surgery and in the post operative period were graded in severity according to the Clavien-Dindo classification of the various surgical conditions.⁶

Statistical analysis

The data so collected were entered in excel sheet. Data was analysed in Microsoft excel software. Data was analysed in the form of mean, range and percentages.

RESULTS

Total 4089 patients from birth to 18 years of age were admitted to the pediatric department during study period, 179 (4%) patients were under the care of pediatric surgeon. The 127 (3%) were enrolled in the study. Males were 93 (73.2%) with a male to female ratio of 2.7:1.

Table 1: Distribution of patients according to age groups.

Age group of patients (years)	No. of patients	Percentage (%)
Less than 1 month	18	14.17
>1 month to 1	23	18.11
>1 year to 5	45	35.43
>5 years to 10	30	23.62
>10 years to 18	11	8.66
Total	127	100.00

Largest umber 45 (35.43%) of patients were in the age group 1-5 years followed by 5-10 years age group 30 (23.62%).

The highest number of admissions were for the gastro intestinal causes 52 (40.9%), followed by genito urinary system 40 (31.5%), central nervous system 10 (7.9%), respiratory system 2 (1.5%) and other cases made up to 23 (18.2%).

The congenital causes of admission 83 (65.35%) and the acquired causes 44 (34.65%) of admissions were categorized as shown in the tables below.

Table 2: Congenital causes pediatric surgical admissions, (n=83).

Diagnosis	No. of admissions	%
Inguinal hernia	23	27.71
Hypospadias	13	15.66
Hydrocele	9	10.84
Anorectal malformation	5	6.02
Hirschsprung's disease	4	4.81
Congenital hydrocephalus	4	4.81
Undescended testes	4	4.81
Meningocele	3	3.61
Tracheo-esophageal fistula	3	3.61
Pyloric stenosis	2	2.40
Ganglion right hand	2	2.40
Abdominal wall defect	1	1.20
Atresia	1	1.20
Branchial cyst	1	1.20
Congenital absence of middle 1/3rd of left eyelid	1	1.20
Left hand polydactyly with gangrenous little finger left hand	1	1.20
Mid gut rotation	1	1.20
Recto-vaginal fistula	1	1.20
Right angular dermoid cyst	1	1.20
Tongue tie	1	1.20
VUR*	1	1.20
Left sided PUJ# obstruction	1	1.20
Total	83	100

*VUR- vesico- ureteral reflux, #PUJ- Pelvi- ureteric junction.

Table 3: Acquired causes pediatric surgical admissions, (n=44).

Diagnosis	No. of admissions	Percentage (%)
Genito urinary problems	12	27.27
Gastro-intestinal problems	11	25
CNS problems	3	6.81
Respiratory problems	2	4.54
Trauma	3	2.4
Others	13	29.5
Total	44	100

The commonest congenital anomalies were inguinal hernia 23 (27.7%), hypospadias 14 (15.66%), hydrocele 9 (10.84%), anorectal malformations 5 (6.02%), Hirschsprung's disease 4 (4.81%), hydrocephalus 4 (4.81%), and undescended testes 4 (4.81%).

Most common gastro-intestinal condition was inguinal hernia 23 (18.1%) followed by 5 (3.9%) anorectal malformations, 4 (3.14%) Hirschsprung's disease, 4 (3.14%) NEC/intestinal perforation, 3 (2.36%) tracheoesophageal fistula.

Table 4: Distribution of patients with genito-urinary conditions.

Condition	Numbers
Hypospadias	14
Hydrocele	9
Phimosis	4
Undescended testes	4
Ovarian cyst	2
Labial synechia	1
PUJ# obstruction	1
Meatal stenosis	1
Renal calculi	1
Stricture uretero-vesical junction	1
VUR*	1
Urethral stricture	1

*VUR- vesico- ureteral reflux, #PUJ- Pelvi- ureteric junction)

Genitourinary conditions accounted for 40 of 127 patients, hypospadias was the most common 14 (11.02%), 9 (7.08%) hydrocele, 4 (3.1%) phimosis and undescended testes each.

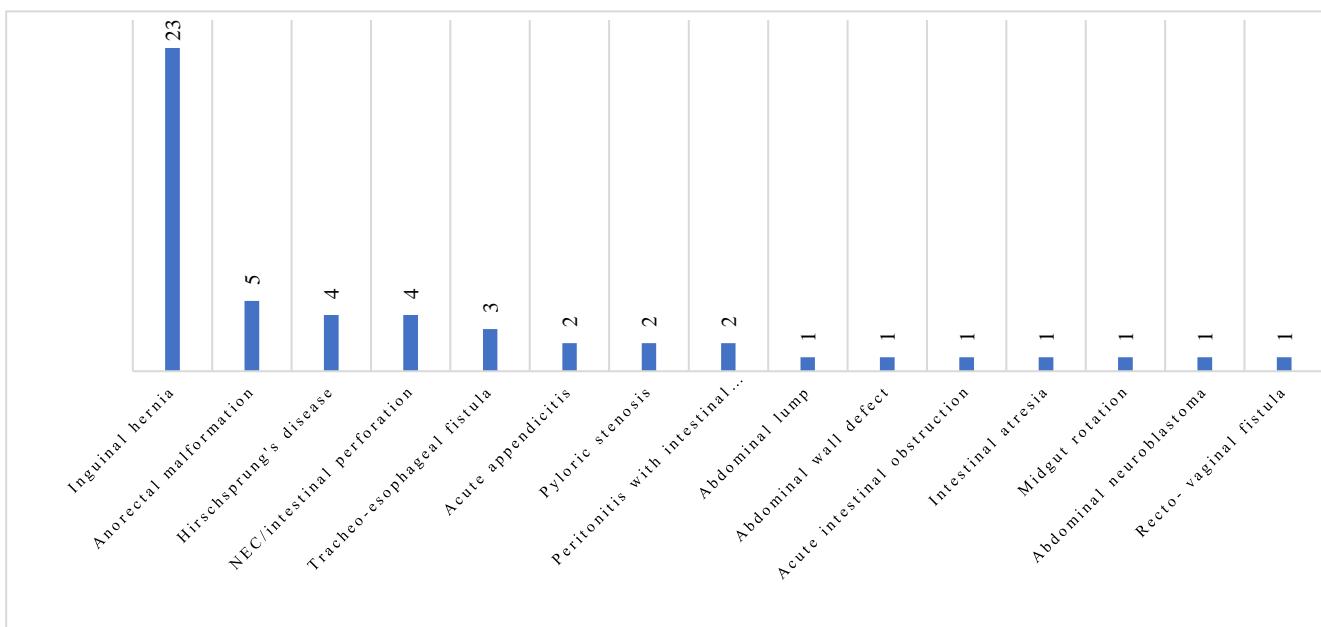
There were ten patients with CNS diseases. Out of them 7 (5.51%) patients had hydrocephalus (Congenital and acquired), and 3 (2.36%) patients had meningocele. Out of the 2 patients of respiratory system 1 (0.87%) each of pyothorax and bronchogenic cyst. The rest constituted to about 23 (18.11%) patients.

Table 5: Distribution of grades of complications.

Complication	No. of patients
Grade I	16
Grade II	18
Grade III-a	0
Grade III-b	5
Grade IV	4
Grade V	3
Total	46

Complications graded according to the Clavien-Dindo classification for grading of conditions in the post operative period.

Complications were recorded in 46 (36.22%) patients. Only three patients had grade V complication while majority 34 (73.91%) patients had milder complications.

**Figure 1: Distribution of patients with the gastro intestinal conditions.****Table 6: Distribution of outcome in relation to systems involved.**

System involvement	Admissions	Discharges	Deaths
Gastro intestinal system	52	47	3
Genito urinary system	40	40	0
Central nervous system	10	10	0
Respiratory system	2	2	0
Others	23	23	0
Total	127	124	3

The average duration of stay was 7.7 day whereas it was 15 days in neonates, 9 days for infants, 6 days for children aged between 1-5 years, 8 days for all children older than 5 years. The average duration of stay for respiratory system was 14 days, CNS 13.2 days, gastro intestinal system 9.1 days, genito-urinary system 7.8 days. Total 124 patients were discharged after treatment. Ninety one of 93 males and 33 out of 34 females were discharged, however two male and one female patient succumbed. All the 3 patients who died were neonates.

DISCUSSION

The childhood surgical conditions are common in developing countries and that poor care results in significant disabilities and deaths.⁷ Primary care can only

succeed if supported by an early, efficient and reliable referral system with an infrastructure extending from the primary to the tertiary level, so that pediatric surgical conditions can be treated effectively. Children have distinct surgical conditions and have unique anesthetic challenges. Each child has special peri-operative needs which requires a careful post operative monitoring.⁷

In current study among pediatric admissions 4% had associated pediatric surgical condition. In a study by Chapp-Jumbo et al patients with pediatric surgical were 11%.⁵ The male to female ratio was 2.7:1. This may be due to the large number of patients (24.5%) admitted with male genitourinary problems, similar findings were reported by Doumi et al.⁴

In this study gastrointestinal diseases constitutes 52 (40.8%), genitourinary diseases 40 (31.4%), central nervous system diseases 10 (7.87%), of pediatric surgical admission. Trauma cases were 2.4%. Reported trauma cases in other studies under similar scenarios done were comparatively high.^{4,5,8} Injury was found to be the commonest cause in these studies. It has been found that road traffic accidents, falls, burns and accidental poisoning were the commonest categories of childhood injuries.⁹ This difference in incident of trauma cases may be due to the location of Dhiraj hospital, being private hospital and far off from city limits are among the reasons of few numbers of trauma cases. A large number of patients that come to Dhiraj hospital are from nearby states. These patients either get primary care from some other hospital, or get admitted to some other centre. But in view of relatively increasing trauma cases, child safety should be a priority. There is a need to run awareness programs such as education campaigns, road shows, posters etc. Road traffic safety measures should be taken

by timely maintenance of roads, adequate and appropriate law enforcement, and provision of adequate public transport systems. Adequate changes and policy formulations are required to reduce injuries in children in view of primarily preventing injuries, rather than treating them. Disability can be avoided in most children with institution of timely intervention and primary care.

In current study, congenital anomalies were the commonest causes of admission, amounting to 83 (65.35%), similar finding was reported by Doumi et al.⁴ In current study Inguinal hernia constitute 23 (27.72%) of all the congenital admissions. similar finding 34.2% was reported by Doumi et al.⁴ Infants and Neonates together made up to 41 (32%) out of 127 patients, that contributed to the higher number of congenital anomalies, common ones included Hirschsprung's disease, TEF, anorectal malformations, and abdominal wall defects, hydrocephalus, neural tube defects. Majority of (38%) congenital anomalies were among neonates and infants. Gross congenital anomalies in children born at Dhiraj hospital were easily recognized and prompt referrals were carried out. Disease conditions that required special investigations to diagnose were carried out in Dhiraj hospital promptly. Children born outside and referred late or with inadequate care during transport posed massive challenges. Such patients had a longer duration of stay and worse outcomes.

Post-operative nosocomial sepsis and wound infection were more common among surgical neonates in NICU. This was perhaps because they were admitted and shared the same facilities with neonates that had septic and infectious pathology. Such admissions were also reported by other authors as a major cause of nosocomial infection in other centers.^{10,11} Sepsis was found to be the most devastating complication in current study. Sowande et al reported that sepsis was the most common complication and had the worst outcome.¹² Sowande et al reported mortality of 53.6% among neonatal patients while mortality in current study was 3 (16%) among neonates. Lack of good anesthetists is also a major challenge as reported Mhando et al.¹³

Other factors that determine outcome of neonatal surgical condition includes prematurity and type of congenital anomaly, in many cases, the final outcome is often determined by the type of initial care received at the referring hospital, during transport, as well as intra- and postoperative management of these neonates. In most developing countries, preoperative stabilization before referral of neonates requiring emergency surgery is lacking.^{12,14} Most neonates often arrive at the hospital being carried by their parents without being accompanied by any health personnel. Where no attempts are usually made at pre-transport resuscitation or stabilization and are usually withheld during transfer.¹² In our study it was found that of the three patients that had expired, two had arrived at the hospital, with inadequate care during the

transport. This established transport as an important risk factor for the final outcome especially in neonates.

Cases with gastrointestinal causes were the most common cause of pediatric surgical admission (40.9%), the commonest being inguinal hernia (18.11%). Similar patterns of gastrointestinal causes of admissions were noted in a study by Doumi et al. The commonest cause of admission in that study was also found to be inguinal hernia which was found to be (13.76%).⁴ Mortality was recorded with gastrointestinal surgical pathologies. This finding was similar to findings in other studies done at other centres.^{8,9,15}

Cases with urogenital anomalies were 40 (31.4%) mainly pre-school and school boys. Similar observations in other communities were seen in study done by David et al.¹⁶ In a study by Thanni et al cryptorchidism was commonest genitourinary condition.¹⁵ Outcome of genitourinary condition were excellent. No mortality was recorded in any of patients. A similar finding was reported by Jumbo et al.⁵

Cases with CNS anomalies were 10 (7.8%). Most common condition was hydrocephalus 7 (5.5%) followed by myelomeningocele. V-P shunting was done for all patients of hydrocephalus. Complications were noted in all the patients in whom VP shunting was done. Two patients required shunt revision. Ahmed et al in a study for outcome analysis of shunt surgery in hydrocephalus, found that 52% of the patients suffered from complications. The most common complications were shunt blockage and shunt infection. These complications necessitated repeated shunt revisions.¹⁷

Complications were present in both patients of respiratory system in the post operative period. The patient with bronchogenic cyst developed pneumothorax. This led to longer duration of stay, intensive care unit care. The number of patients however was too small to comment.

In our study it was found that complications were more commonly noted in children who had other co morbid conditions. Post operative complications were found in the forty-five (35%) patients. The exact incidences of the common postoperative complications in children are not known.¹⁸ post operative complications are more common among children <3 years and more so in infants.¹⁹ The report of morbidity and mortality in literature comes primarily from sources like institutional audits, close claim studies and reporting of anaesthesia-related cardiac arrests.¹⁸ Complications in the postoperative period have reduced considerably after introduction of monitors, especially the pulse oximeter in clinical practice. Availability of newer faster acting anesthetic drugs has played a role in reducing the incidence of complications and the recovery from anesthesia is faster. However, complications like laryngospasm and emergence delirium are seen more often with the inhalational agents.

As hospital admission data can be a reasonable tool for assessing the epidemiology of disease within populations, the results of this study provide valuable insight into the surgical conditions that affect children in community. Such information is necessary for assessing the burden of pediatric surgical diseases on the health system, the impact of surgical conditions on child health and for setting priorities to improve pediatric surgical care. Progress can only occur if improving poor surgical care is recognized as a significant public health problem and considered as an essential component of child health programs.¹⁹ The challenge remains in delivering effective pediatric surgical services in-spite of the constraints on resources, and that service should facilitate teaching, training and relevant research.

Limitations

This study was conducted in the tertiary care hospital and it does not reflect true burden of pediatric surgical problems in the community. It needs large community-based study to assess true burden of congenital and acquired pediatric surgical problems.

CONCLUSION

Surgical conditions are important part of pediatric and neonatal care. NEC has worst outcome and need early identification and management for better outcome. Management of congenital surgical condition is important to decrease infant and under five mortality and other comorbidities as well.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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