



EVOLUTION OF PEDIATRIC SURGICAL SERVICES IN A MEDICAL COLLEGE: DEPARTMENTAL ANALYSIS & AUDIT

Pediatric Surgery

Dr. Manisha Albal Professor & Head, Department of Pediatric Surgery, NKP Salve Institute of Medical Sciences, Nagpur, Maharashtra.

Dr. Prasad Y. Bansod* Assistant Professor, Department of Surgery, Government Medical College & Hospital, Nagpur, Maharashtra. *Corresponding Author

ABSTRACT

Objective: Aim of this study is to assess the pattern, case work load, and variety of pediatric surgical conditions managed, various paediatric surgical operative procedures performed and outcome of the same.

Methods: Analysis was done retrospectively of the paediatric surgical services provided by the department at a tertiary care hospital in central India. Data was collected by compiling computerized, hand written case files and hospital ward records over a 9-year period from 2011 to 2019. Total 2996 children with surgical disorders were evaluated and studied. There were 1887 male and 1109 female children, with 131 infants & 42 neonates.

Results: Majority of the patients were operated (59.51%), while 40.48% were managed conservatively. Gastrointestinal surgeries contributed maximum patient workload (37%). Major procedures accounted for 929 (52.10) while minor procedures were done in 854 (47.89%). Elective operations were done in 72%, while Emergency surgeries were done in 27% of the patients. Circumcision, Appendectomy, Herniotomies, Hypospadias and drainage of abscess were the commonest surgeries performed overall. Surgical wound infection was the commonest complication observed (7.5%) while overall mortality was 0.8% in our study.

Conclusions: This study covers the work spectrum done by paediatric surgery department in a tertiary care hospital in central India. Provision of adequate resources, training manpower, development of health infrastructure and dedicated department establishment along with willpower and administrative support ensure improved patient care in children requiring surgical intervention

KEYWORDS

Audit, Paediatric Surgical Services, Congenital Anomalies, Neonatal Surgery, Tertiary Care Hospital, Childhood Injuries.

INTRODUCTION

The last few decades have seen an exponential rise in the fields of super specialisations in surgery. Various system specific & organ specific branches have emerged within the field of surgery which have improved approach and overall healthcare outcomes. Pediatric surgery is an established independent speciality in surgical field. Admission of children with similar surgical diseases, under single wards, with trained manpower & facilities which handle very specific aspect of pediatric surgical diseases has made accurate surgical diagnosis and outcomes. [1,2]

This picture was mostly seen in developed countries which have dedicated children hospitals with well organised super specialties. However, since last few decades, developing countries have begun establishing independent Speciality of surgery. Traditionally pediatric surgical emergencies were supposed to be managed by general surgical teams, however, independent & well established pediatric surgical departments have overtaken the surgical domains as it was accepted that a child is not a miniature adult. Lack of dedicated resources results in sharing of necessary facilities for pediatric surgical workload, this includes ICU beds, instruments, endoscopes, operating rooms (ORs) nursing staff, other surgical and at times non-surgical wards. This definitely affects the quality of care and outcomes in children with surgical disorders. [3,4]

There is very scarce data available on admissions, pediatric surgical case load, specific surgical requirements & various factors which affect in policy making in development of a standard pediatric surgical unit. Our 9-year retrospective departmental audit is an attempt to determine various factors, identify spectrum of pediatric surgical disorders, and measure the various outcomes of pediatric surgical department at a tertiary care hospital in central India.

MATERIALS AND METHODS

The retrospective 9-year internal audit was taken between January 2011 to December 2019 at NKP Salve institute of medical Sciences and research centre, Nagpur (NKPSIMS). It is a tertiary care multispecialty medical college & hospital in central India, with affiliations to the state health university. An independent pediatric surgical department with 30 beds (20 ward+ 5 PICU+5 NICU) is fully functional under pediatric surgical consultants, rotational surgical residents and ancillary staff. It acts as a major referral centre in Nagpur and surrounding districts & states. The department provides general pediatric surgical care, elective as well as emergency pediatric care consults and jointly works with neonatologists in pediatric ICU.

Handwritten case files & records were retrieved from wards, medical records department, audit registers & operation theatre log books. It was complimented with computerised database. The data collected was categorised into basic demographic profiles of patients, admissions, diagnosis, peri-operative, complications & discharge records. All patients admitted in pediatric surgical ward during the study period were included. Outcomes were evaluated based on the available parameters.

In this observational study, the data obtained on descriptive statistics was presented in tabular format with mean, standard deviation, percentage. For analytical statistics, categorical variables were expressed in actual numbers. Appropriate statistical tests were applied wherever necessary.

RESULTS

The infrastructure, available manpower, various facilities offered by the department is shown in table 1. Outpatient department (OPD) screened 13,485 pediatric patients during the 9-year study period. Year wise distribution of OPD, IPD patients along with mortality is shown in table 2. Majority of the patients who visited the institute for pediatric surgical consult were from the urban Nagpur region (44%), followed by patients from suburban & rural Nagpur (32%). Besides Nagpur district, the majority of the patients who got treatment here belonged to Madhya Pradesh (10%). (Figure 1)

Table 1 showing frequency & availability of various facilities in pediatric surgical department

	Facilities	Number
1	Number of beds	Ward - 20 PICU- 5 NICU- 5 Total- 30
2	Consultant Surgeon	1
3	House Officers (Resident Doctor)	1
4	Nursing Staff	6 (On rotation duty)
5	Admissions	
	• Elective	• Twice a week (Tuesday & Friday)
	• Emergency	• Every day (24x7)
6	Operation theatre facility	
	• Elective	• Twice a week (Monday & Thursday) shared with other surgical units
	• Emergency	• Every day (24x7) shared with other surgical units

Table 2 showing year wise patient distribution in OPD, IPD & Mortality

YEAR	OPD PATIENTS	IPD PATIENTS	MORTALITY
2011	208	36	0
2012	468	186	4
2013	676	216	3
2014	1196	238	2
2015	1404	390	3
2016	1798	564	5
2017	2173	536	3
2018	2496	420	3
2019	3066	410	2
TOTAL	13485	2996	25

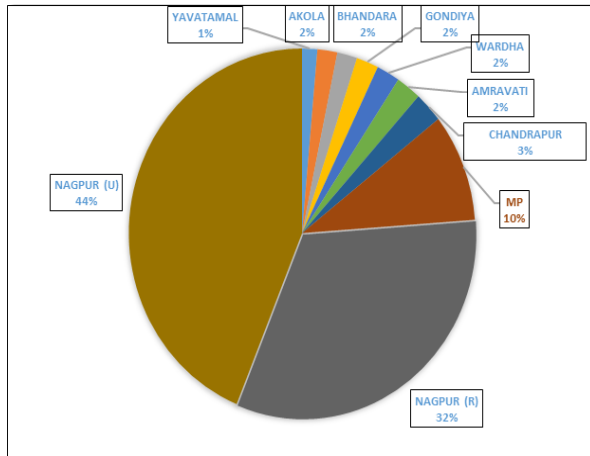


Figure 1 showing region wise patient distribution

A total of 2996 patients from one day old up to 18 year of age with surgical disorders were included in the study. It comprised of 1887 (62.98%) male children and 1109 (37.01%) female children. Of these patients, 42 (1.4%) were neonates, 131 (4.3%) were infants. Toddlers [1-3 year] accounted 583 (19.4%) while preschool [3-6 year] children were 966 (32.2%). Primary school kids [6-12 year] comprised 679 (22.66%), while adolescents [12-18 years] had 595 (19.8%) share in the age distribution.

Out of total children admitted, majority of the children 1783 (59.51%) underwent some surgical intervention, while 1213(40.48%) patients were managed conservatively. Among the total number of patients operated, elective surgeries were done in 1296 (72.68%) cases while 487 (27.31%) underwent emergency surgical procedures.

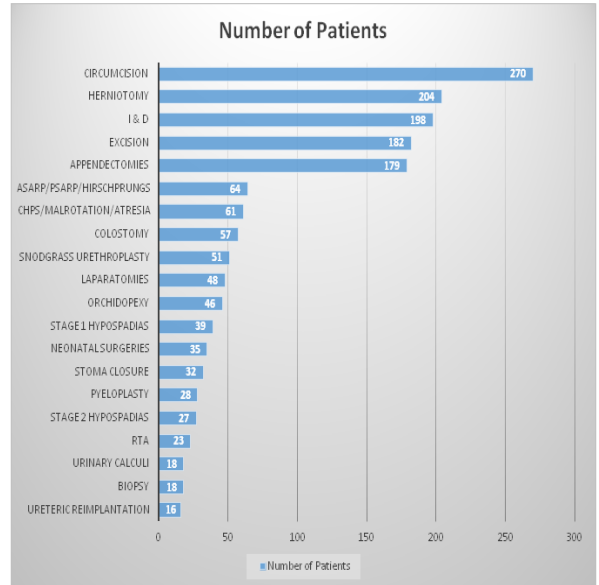
Among various specialities, Gastrointestinal (GI) surgery accounted for 660 (37.01%) of patients, followed by general pediatric surgery & urology patients. Detailed speciality wise patient distribution is shown in table 3.

Table 3 distribution of patients across various pediatric surgical super specialities

PEDIATRIC SPECIALITIES	Number of patients (%)
GI Surgery	660 (37.01%)
General Surgery	536 (30.06%)
Urology	525 (29.44%)
Onco surgery	23 (1.28%)
Neuro surgery	18 (1%)
Plastic Surgery	13 (0.72%)
Thoracic Surgery	8 (0.44%)
Total operated patients	1783 (59.51%)
Conservative	1213 (40.48%)
TOTAL	2996

Circumcision was the commonest surgery performed. It was followed by herniotomies, appendectomies, Hypospadias, incision & drainage and excisions. Common operations performed during the study period are shown in the table 4.

Table 4 showing top-20 surgeries performed during the study period (Includes both elective & emergency surgeries)



The mean duration of hospital stay was 10±10.2 days. The overall mortality was 25 (0.83%). The most common complication observed in our study was postoperative wound infection & sepsis. Table 5 below depicts various common complications with their frequency.

Table 5 showing common complications

COMPLICATION	NUMBER
Woundinfection	134(7.51%)
Urethrocuteaneousfistula	13(11.11%)
Fecalfistula	2(0.47%)
Burstabdomen	1(0.15%)

Majority of the patients belonged to general category and did not take advantage of recently introduced various financial schemes. The most common financial availment was from BPL (W) category followed by benefit as a "Camp case" patient as shown in Table 6.

Table 6 showing distribution of financial facility availed by admitted patients

TYPE OF FINANCIAL FACILITY	NUMBER OF PATIENTS
General	2332(77.83%)
BPL(W)	176(5.84%)
Campcasebenefit	148(4.93%)
Healthcentrebenefit	126(4.2%)
RGJAY	63(2.1%)
BPL(I)	57(1.9%)
Mahatma Jyotiba Phule JanArogya Yojana	45(1.5%)
ESIS	32(1.06%)
Staff&Others	17(0.56%)
TOTAL	2996

DISCUSSION

The audit of this department observed majority of the patient being operated for pediatric surgical pathology. The available human and material resources were under considerable burden and many times overworked. The disparity between the case workload and available resources is clearly present. Such findings are also seen in similar studies from other developing countries. [4,5,6,7]

Majority of the patients who visited the institute for pediatric surgical consult belonged to the district itself. Besides Nagpur district, a major chunk of patients who get treatment here belong to Madhya Pradesh. It is well known fact that Nagpur forms a major referral centre for patients in central India where a large number of patients come from Madhya Pradesh, Chhattisgarh & some regions of northern Telangana.

With a capacity of 30 bedded pediatric surgical care ward, it was found that the beds remained occupied for most of the times of the year. Major chunk of the patients belonged to GI, urology and general pediatric surgery. Circumcision, congenital hernia, hydrocele, various lumps (excisions), hypospadias and appendicitis are common problems described in pediatric age group. We encountered them in

similar frequency as described in various surgical textbooks. Majority of our patients were operated on elective basis. Emergency surgical procedures were operated in around 27% of cases.

Neonatal & pediatric ICU are equipped with cradles with radiant warmers and ventilators. Patients operated in emergency and supramajor surgeries required ICU care, while most other patients were directly shifted in the wards postoperatively. A wide variety of cases were operated during the study period involving almost every system (table -4). Postoperative care was looked upon by resident posted in the department along with nursing staff. Consultants were on call for emergencies.

Commonest operations performed were circumcision, herniotomies for hernia & congenital hydrocele, incision and drainage of abscesses and excisions. Besides these, operations were done for conditions like CHPS (Congenital Hypertrophic Pyloric Stenosis), Tracheo-Oesophageal fistula, Gastric duplications, Exomphalos minor, Malrotations of the gut, Various atresia, Ano-rectal malformations (ARM), Hirschsprung disease, Choledochal cyst excisions with Hepaticoduodenostomy, Cholecystectomies, Lateral pancreatojejunostomy, Pancreatic pseudo cysts, Stoma creation and stoma closure, Splenectomies, Mesenteric cysts, & Fundoplication. Gastrointestinal surgeries comprised significant case load as mentioned above.

Among thoracic surgeries, Diaphragmatic hernia, Eventration of diaphragm, decortications (for chronic empyema), and excision lung cysts were the common procedures performed.

In Urology, Pyeloplasty, Vesico-ureteric reimplantation, surgeries for ureteric obstructions, PU Valves, urinary calculi, nephrectomies, patent Urachus, Urachus cyst, exstrophy of bladder, and congenital malformations like Anorectal malformations & cloaca were also performed with success.

Cases of pediatric oncology & tumours were also managed. Handful of cases of Wilms's tumour, Teratoma, testicular tumours, lymphoma were managed. A few cases of Neuroblastoma and Hepatoblastoma were also seen during the study period.

Pediatric trauma cases were also dealt on case to case basis. Emergency Splenectomy, enteric perforations and insertion of intercostal drains were the common procedures carried out by pediatric surgeons. Majority of the stable children with abdominal trauma were managed in intensive care unit under strict observation and monitoring. [8]

Plastic surgery and neurosurgery departments are separate established departments in our centre which function independently. Cases of road traffic accidents (RTA's), crush injuries, burn cases and reconstructive surgeries were the main domains of their work. Pediatric surgical consult and expert intraoperative assistance was provided wherever necessary.

Postoperative wound infection was commonest complication observed during the study period which was the main cause for prolonged hospital stay. The overall mortality was seen in 25 patients (0.83%), with 14 neonatal, 4 infants and 7 children. Infections, directly or indirectly contributed as a major reason for mortality in our study. Prematurity, poorly developed immunity in neonates make neonates more susceptible for infection and overall mortality. [9,10,11,12]. Emergency cases, late presentation, resistant infection also contributed to mortality. Children with GI pathologies contributed most to mortality, majority of which were congenital anomalies. Urology & general pediatric surgical cases had excellent outcomes and were the common indications for admissions. [13,14]

As shown, majority of the patients financed the healthcare bill from their pocket (savings) which are categorised in general type (Table 6). This accounted for 77.8%. It is seen from the table that in spite of availability of various healthcare schemes from central and state government, families have to spend through their pocket and very less people get the benefit of these schemes. This fact may be attributed to illiteracy of the caregivers, unavailability of documents necessary to avail the benefits of the scheme along with various ineligibility criteria and absence of incentives to the staffs. At times the procedure was not available under any health plan. Proper information, awareness and

education about the availability of healthcare schemes along with willpower to implement it might help to reduce the burden on the family.

Role of pediatric surgery in Antenatal period

This needs a special mention. Pediatric surgical consultation plays a significant role when congenital anomalies are detected during antenatal scans. They help in educating the family regarding the possible lesions, need of advanced imaging techniques, time & mode of delivery, possible surgical interventions (when indicated) and expected postnatal/ postsurgical outcomes. Prospective parents need to be educated and well prepared financially and psychologically. Anomaly scan by ultrasonography should be reviewed and anomalies should be categorised. Surgically correctable anomalies should be treated, while peri-conceptual Folic acid should be provided to prevent neural tube defects.

This audit helped us identify our potential as well as limitations as healthcare professionals. For smooth functioning of a pediatric surgical hospital adequate number of dedicated beds, consultant surgeons, super-speciality training residents, trained nursing and ancillary staff, well equipped modular operation theatre dedicated to pediatric surgery attached with intensive care units, diagnostic and therapeutic endoscopy facility are essential for better functioning.. Round the clock support from pediatric intensivist, anaesthesia, pathology & frozen section and radiology with pediatric expertise is mandatory. In addition to this a well-equipped pharmacy, blood & component bank and digital record keeping plays a vital role in department function. Well planned & coordinated steps taken in consultation with clinicians of the concerned departments is must to improve the quality of healthcare. Regular clinical discussions and interdepartmental activities will provide multidisciplinary clinical approach towards the patients along with academic enhancement. Role of social worker cannot be underestimated. Frequent quality checks, performance assays and medical & surgical audits will help in identifying the deficiencies, pinpoint the limitations, and provide with chance to rectify the incurred errors consequently improving transparency and augmenting patient related healthcare services.

CONCLUSION

Inadequate resources contributed to majority of the problems faced by us in the department. A need for provision of more pediatric surgical facilities, training & retaining trained personnel would contribute in bridging the mismatch in high pediatric surgical casework.

It also highlights the need of establishing full-fledged paediatric surgery department with separate pediatric surgical ward and well-equipped surgical intensive care unit.

We believe this article will provide the necessary data for policy formulations and help improve quality and quantity of pediatric surgical services thereby ensuring prompt and improved patient care eventually bringing down morbidity and mortality of children requiring surgical intervention.

Ethical approval

The protocol for the study was approved by the institutional ethics committee.

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Author Contribution

Dr. Manisha Albal - Study design, Writing.
Dr. Prasad Bansod - Data collection, Data Analysis & writing.

Conflict of interest

The authors declare that there are no conflicts of interest.

Guarantor

Dr. Manisha Albal (First Author).
Dr. Prasad Y. Bansod (Corresponding author).

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