

DISTRIBUTION OF PEDIATRIC SURGICAL CASES OVER FIVE YEARS IN A TERTIARY HOSPITAL

Kamrun Laila¹ Mohammad Asif Khan² Pritam Dasgupta^{3*}

Sytuha Binta Ali³ Kamrul Hossain⁴

Abstract

Background: Health care providers have given their efforts to reduce the rate of child mortality and morbidity, throughout the world. But inadequate amount of knowledge about the demand of pediatric surgical care lagging us behind to achieve our goal. The study was conducted to observe the distribution of pediatric surgical cases over five years in the study site. **Materials and methods:** It was a descriptive type of observational study. Data was extracted from record book of surgical procedures done in Department of Pediatric Surgery, Bangabandhu Memorial Hospital (BBMH) Chattogram, over a period of 5 years, from January 2013 to December 2017. Written permission was taken from the hospital authority prior to data collection. Descriptive data analysis was done by Microsoft Excel (Version 2013). **Results:** Out of total 2977 cases, 10-15 years age group had a predominance of 828 cases and the least was more than 15 years age group (672 cases). A male predominance was observed, with 65% of all cases (Total- 1935 cases) while female patients comprised rest of it. Male female ratio was 1.86: 1. Over 5 years period appendicectomy (497) circumcision (530) herniotomy (425) rectal polypectomy (255) showed abundant number covering majority of the surgical procedures. On the contrary, splenectomy with cholecystectomy was the least

performed surgery (5) mostly done for haemolytic disease of newborn (Thalassemia).

Conclusion: To deal with huge amount of surgical patients of pediatric age group an organized effort is required to ensure proper environment and resources to facilitate optimal implementation of surgical care to the future generations of a country.

Key words

Pediatric surgical case; Child mortality and morbidity; Proper environment and Resources.

Introduction

Since the day of Halifax Explosion, occurred on 6th December 1917, pediatric surgery has gone through so much dissection and dissemination that results in a well-established subspecialty of surgery¹. Health care providers have given their efforts to reduce the rate of child mortality and morbidity, throughout the world. But inadequate amount of knowledge about the demand of pediatric surgical care lagging us behind to achieve our goal². At present, previous hospital data comprises more than 97% of clinical research in these field of interest³.

Data, collected from hospital registries, are difficult to interpret and illustrate the actual scenario, especially for the countries with limited resources². In 2013, children of <15 years of age comprises about 26% of the total population, in the world. African region holds the first position, having 42% children (< 15 years) of overall people. In the meantime, 30% of our total population is below 15 years of age, just behind its neighborhood countries, Pakistan (34%) and Nepal (36%)⁴. Bangladesh is the world's eighth most populous country. It's crucial to bypass widespread malnutrition, financial constrain and limited diagnostic aids, to provide surgical treatment in many serious childhood conditions. Scarcity of adequate health care facilities along with one physician and hospital bed for about every 10,000 population, worsen the situation⁵.

1. Associate Professor of Pediatric Surgery
Bangabandhu Memorial Hospital, Chattogram.
2. OSD, Directorate General of Health Services, Dhaka.
3. Senior Clinical Research Assistant
Mahidol-Oxford Tropical Medicine Research Unit
Chattogram Medical College Hospital, Chattogram.
4. Assistant Registrar of Pediatric Surgery
Bangabandhu Memorial Hospital, Chattogram.

***Correspondence:** Dr. Pritam Dasgupta
E-mail: pritamdas3144@gmail.com
Cell: 01839 535357

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From 1990-2016, the rate of child mortality fell 62% across the world, along with under-five deaths dropping from 12.7 million to 5.6 million⁶. In case of older children aged 5-14 years, the world has halved the mortality rate, since 1990⁷. Significant reduction of child mortality over the past decades was enough for Bangladesh to achieve MDG-4 (Millennium Development Goal) but not SDG (Sustainable Development Goals)⁷. Children must bring in the limelight, to achieve all the SDGs, by the year 2030⁸.

From 1988 to 1993, drowning appeared to be most common cause of child mortality in Chittagong, whereas surgically correctable diseases like congenital anomaly attributed no death at all⁹. But, from January 2008 to December 2012, another study revealed the significance of birth defects in the field of pediatric health care services. There were 225 deaths for birth defects in Chittagong over the period of five years. Meanwhile, birth defects accounted for 44.61% pediatric surgical admissions. Gastrointestinal system involvement was the commonest one, followed by genitourinary involvement¹⁰. Surgically curable diseases create an immense pressure on health care systems both socially and financially. Birth defects such as clubfoot, cleft lip, cleft palate, and hernia are commonly left untreated due to lack of surgical access¹¹. Other than birth anomaly, circumcision and appendectomy are the regularly practiced pediatric surgical procedures in our country.

From the perspective of pediatric surgery, the number of child mortality and morbidity can be easily reduced by detecting the risk group, based on their age, gender, social and economic status, physical strength etc. If we can sought out the frequently practiced procedures in a resource limited setting, it will be much easier to identify major challenges and improvise strategy to overcome our limitation. Our study was done to evaluate the frequency and availability of different surgical procedures and their indications among the children of different age groups.

Materials and methods

It was a descriptive type of observational study. Data was extracted from record book of surgical procedures done in Department of Pediatric Surgery, Bangabandhu Memorial Hospital (BBMH) Chattogram, over a period of 5 years, from January 2013 to December 2017. BBMH is a teaching hospital with a 12 bedded Pediatric Surgery Department.

There was no well-equipped, specialized operation theatre for pediatric surgery. Surgical schedules were maintained in close communication with the Department of General Surgery and Department of Anesthesia. Neonatal surgeries were conducted in collaboration with Neonatal Intensive Care Unit (NICU) and postoperative support was given by the department of pediatric medicine when required. Other postoperative cases were duly managed by the duty doctors. Emergency operations were conducted by the respected pediatric surgeons in a regular basis. Total sample size was 2977, aged less than 18 years. Written permission was taken from the hospital authority prior to data collection. Descriptive data analysis was done by Microsoft Excel (Version 2013).

Inclusion criteria

- i. Surgical cases operated in Department of Pediatric Surgery, Bangabandhu Memorial Hospital (BBMH) Chattogram.
- ii. Age < 18 years.

Exclusion criteria

- i. Patients admitted in Department of Pediatric Surgery, Bangabandhu Memorial Hospital, Chattogram but didn't need any surgery
- ii. Age > 18 years.

Results

Total 2977 surgical procedures were done in Pediatric Surgery Department of BBMH from 2013 to 2017 among different age groups. 10-15 years age group had a predominance of 828 cases and the least was more than 15 years age group (672 cases). Whereas 717 & 760 cases belonged to 0-5 years & 5-10 years respectively. Over 5 years period appendectomy (497) circumcision (530) herniotomy (425) rectal polypectomy (255) showed abundant number covering majority of the surgical procedures. On the contrary, splenectomy with cholecystectomy was the least performed surgery (5) mostly done for haemolytic disease of newborn (Thalassemia) followed by radical nephrectomy for renal cell carcinoma (7) & nephroblastoma (11) colostomy (11) transanal pull through (17) orchidectomy due to testicular neoplasm (17) and Ramstedt pyloromyotomy (21) (Table I).

A male predominance was observed, with 65% of all cases (Total- 1935 cases), while female patients comprised rest of it. Male female ratio was 1.86: 1. Surgical interventions performed over 5 years showed variety of indications. Whereas all surgical cases can be categorized in three main groups-

Gastrointestinal, genitourinary and miscellaneous (Fig 1). Almost half of the patient had gastrointestinal surgery (1451 cases) and another major group was genitourinary cases (1312 cases). Hence some miscellaneous procedures (214) included sclerotherapy, tongue tie repair, removal of dermoid cysts etc. Among the gastrointestinal cases, appendicectomy was the mostly performed procedure while circumcision was registered as the commonest genitourinary intervention.

Total 131 cases underwent exploratory laparotomy and diagnosed with intestinal obstructions due to various pathology (Fig 2). In our study, majority (51 cases) of the patient had intestinal obstruction due to ascariasis. Predominant age group having ascariasis was 0-10 years. Moreover, intussusceptions and volvulus were found only in 0 to 5 years age group. In addition, intussusception was diagnosed in 28 patients which comprises nearly half of the cases as in ascariasis. Appendicitis was found to be a significant cause of pediatric surgery which constituted total case of 497. Among these, appendicular lump was found to be the least (80 out of 497) perioperatively, while burst appendices and inflamed appendices were found more than two fold of the former finding, 205 & 212 cases respectively. From our study it is noticeable that appendicectomy was chiefly done in age group more than 10 years with a total of 371 cases over 5 years.

Spinal anesthesia was used in 16% (463) of all pediatric surgery, mainly given to the patients over 10 years old and surgeries included herniotomy, urethroplasty, orchidectomy, orchidopexy and surgical exploration for torsion of testis. Ketamine anesthesia was mainly used in minor surgical procedures like meatotomy, sclerotherapy, polypectomy and circumcision. 38% of all cases were done by Ketamine anesthesia. Major surgical procedures were done under intubation anesthesia but it was used in some minor cases as well for surgical convenience especially in younger age group (Less than 10 years) with a total case of 1429 (Fig 3).

The highest cases of circumcision (148) and appendicectomy (139) were performed in year 2013 while maximum number of herniotomy was performed in year 2015 (119). It is evident that quantity of surgical procedures performed is minimum in the year 2014 for all procedures (Circumcision-64, appendicectomy-60, herniotomy-51, laparotomy-11, orchidectomy-17). Variation of surgical

procedures performed per year was roughly less fluctuating in case of laparotomy and orchidectomy. But amount of herniotomy performed in year 2016 & 2017 were almost identical to each other. From the overall view point, a decreasing trend was noticed over the years which should be evaluated further (Fig 4).

Table I : Different surgical procedures in different age groups

Surgical procedures	Age groups				Total
	0-5 Years	5-10 Years	10-15 Years	>15 Years	
Circumcision	150	125	160	95	530
Appendicectomy	44	82	183	188	497
Herniotomy	95	105	150	75	425
Rectal polypectomy	65	60	45	85	255
Orchidopexy	35	45	48	28	156
Meatotomy	25	62	36	31	154
Orchidectomy	28	34	38	48	148
Urethroplasty	35	45	38	28	146
Sclerotherapy	35	36	45	30	146
Laparotomy	93	28	8	2	131
Excision & biopsy of Dermoid cyst	11	21	23	13	68
Pyeloplasty	8	18	11	0	37
Surgical exploration for testicular torsion	2	25	5	5	37
Removal of renal stone	1	10	3	21	35
Removal of pelvi-ureteric junction stone	1	12	6	15	34
Anoplasty	25	4	2	0	31
Tongue tie repair	10	11	6	2	29
Excision & biopsy of mesenteric cyst	3	13	10	3	29
Ramsted's pyloromyotomy for IHPS	21	0	0	0	21
Transanal pull through operation	12	4	1	0	17
Orchidectomy due to testicular neoplasm	2	8	5	2	17
Colostomy	0	8	3	0	11
Radical nephrectomy for nephroblastoma	10	1	0	0	11
Radical nephrectomy due to RCC*	1	3	2	1	7
Cholecystectomy with splenectomy	5	0	0	0	5

*RCC= Renal Cell Carcinoma

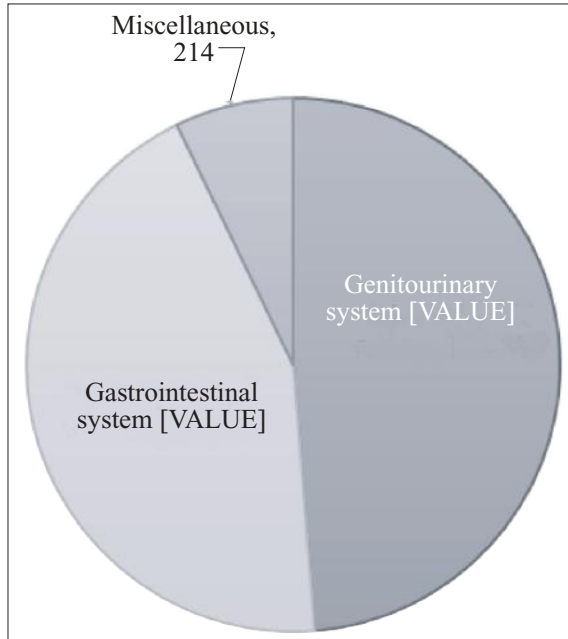


Fig 1 : Number of operated cases of different systems

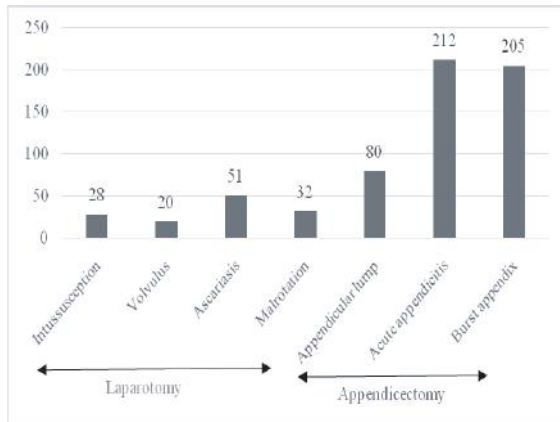


Fig 2 : Perioperative diagnosis during laparotomy and appendicectomy

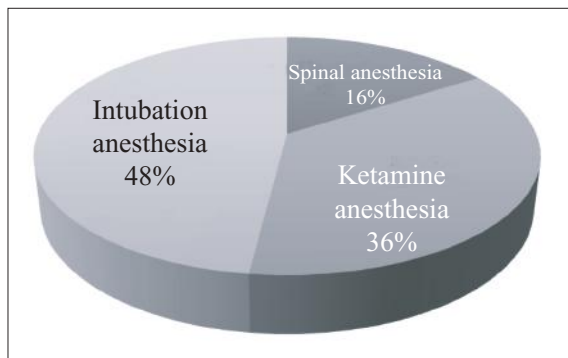


Fig 3 : Types of anesthesia used during surgical procedures

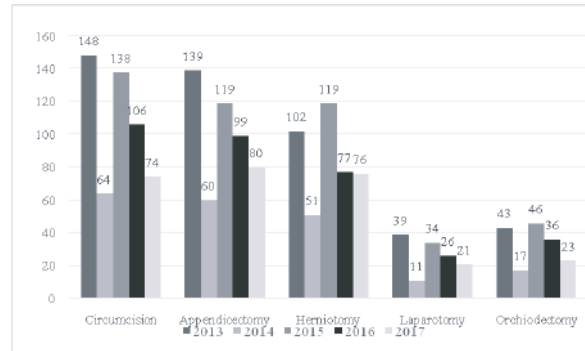


Fig 4 : Yearly distribution of commonly operated procedures

Discussion

The study was conducted to elucidate the spectrum of pediatric surgical pattern in one of the tertiary level hospital of Bangladesh. Among 2977 procedures, 1935 operations were done in male (65%) and 1042 operations were done in female (35%), having a male female ratio of 1.86: 1. The predominance of male can be explained by the prevalence of circumcision¹². In case of postoperative diagnosis, another study showed that acute appendicitis, intestinal obstruction and intussusception affected more male (66.2%, 64.3% and 76.5% respectively) than female (33.8%, 35.7%, and 23.5% respectively)¹³. Though our study didn't focus on individual diseases, but the findings are relatively similar in overall scenario.

During our study period, maximum operations (828 out of 2977) were done in the patient of 10- 15 years old. In this group of patient, appendicectomy (183 cases), circumcision (160 cases) and herniotomy (150 cases) were more commonly practiced. Total 497 appendicectomy were done, where only 8.85% patients were below 5 years of age. In other study, only 17% patients were under 5 years of age¹⁴. As stated in different studies, burst appendix was more common in younger patient, which contradict our findings (Just 14.63 % burst appendix occurred in the patients under 10 years of age)^{14,15}. More than 50% children were circumcised before their 10th birthday. Actually, the time point of circumcision varies from region to region, even in the same country¹⁶. Thalassemia, an inherited blood disorder, was the indication for all the 5 cholecystectomy with splenectomy operations.

Circumcision was the most practiced surgical procedure in the study with a total number of 530 cases, followed by appendicectomy (497 cases). Our

findings are totally supported by the previously published report¹⁷. Though circumcision was mostly performed one in our setup, but the number of circumcision declined over the period of 5 years. This trend was also noticed in United State of America¹⁸. Gastrointestinal operation like appendectomy, laparotomy represented same tendency to downfall from 2013 to 2017. Our study reflected the same trend in case of appendectomy comparison to others, though they focused on all age groups rather than children^{19,20}.

Limited access to the children, due to lack of communication, often make it difficult to diagnose a pediatric disease. So, perioperative findings become a helpful way to establish our provisional diagnosis. During appendectomy, we found 205 cases of burst appendix (41.25%), 80 cases of appendicular lump (16.10%) and 212 cases of acute appendicitis (42.66%). Other study revealed that appendectomy was performed due to 68% cases of acute appendicitis and 20% cases of burst appendix²¹. Regarding laparotomy, malrotation (24.43%), ascariasis (38.93%) volvulus (15.27%) and intussusception (21.37%) were the causes of intestinal obstruction in our inquiry. But, interesting findings were found in a similar study which was different from ours' with a low percentage in malrotation (6.88%) and ascariasis (1.79%).

Peritonitis (40%) was the main reason of acute intestinal condition followed by intussusception (26.34%) in their observation²². Moreover, a big role of ascariasis (63.2%) was demonstrated in small bowel obstruction, in other research²³. In our study, ascariasis was treated either by resection and anastomosis or enterotomy and milking of small intestine. Laparotomy followed by release of Ladd's band with appendectomy was done to treat malrotation and untwisting was done in case of midgut volvulus. Intussusception was treated according to the intensity of the diseases. The commonly practiced methods were resection and anastomosis (10 cases) ileostomy (3 cases) manual reduction with appendectomy (15 cases).

Role of anesthesia in pediatric surgery can't be ignored at all. Here, intubation anesthesia (62%) was used in most of the cases. Spinal anesthesia (17%) was the least used one. Ketamine was preferred to use as an anesthetic agent in 21% cases.

Limitations

We had some limitations of our study as well. We didn't focus on the outcome of the surgical procedures. So that, there is no data on mortality, morbidity, postoperative complications. Due to unavailability of well-equipped operation theatre for the pediatric surgery ward, we had to refer many complicated cases of congenital anomaly, trauma to another hospital. The study samples were not randomized. It was a single center study which might not represent the nation-wide picture.

Conclusion

Main purpose of this study was to address the present surgical variation and availability in a resource limited settings which may help to evaluate disease burden aspect of pediatric surgery cases. Our study revealed the predominance of male pediatric patients in the operation theatre. In spite of having circumcision in the mostly performed procedure's list, diverse gastrointestinal causes of pediatric surgery drew our attention for further evaluation. Presence of late complications of diseases proved that the importance of surgery to treat pediatric diseases is often overlooked. But this study provided an insight to the need of improving surgical care in pediatric groups in developing countries like Bangladesh. To deal with huge amount of surgical patients of pediatric age group an organized effort is required to ensure proper environment and resources to facilitate optimal implementation of surgical care to the future generations of a country.

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Contribution of author

KL-Conception, design, acquisition of data, drafting and final approval.

MSK-Analysis, interpretation of data, critical revision of content and final approval.

PD-Acquisition of data, drafting and final approval. SBA-Analysis, critical revision of content and final approval.

KH-Design, drafting and final approval.

Disclosure

All the authors declared no competing interests.

References

1. Nakayama DK. Bulletin of the American College of Surgeons. The Halifax Explosion and the unofficial birth of pediatric surgery. Published 1st May, 2017.
2. Groen RS, Samai M, Petroze RT et al. Household survey in Sierra Leone reveals high prevalence of surgical conditions in children. *World journal of surgery*. 2013;37(6):1220-1226. DOI: <https://doi.org/10.1007/s00268-013-1996-7>.
3. Rangel SJ, Kelsey J, Colby CE et al. Development of a quality assessment scale for retrospective clinical studies in pediatric surgery. *Journal of pediatric surgery*. 2003;38(3):390-396. DOI: <https://doi.org/10.1053/jpsu.2003.50114>.
4. World Health Organization. World health statistics 2015. World Health Organization. 2015; 154-158.
5. Bagwell CE, Shandling B. Pediatric surgery in Bangladesh. *Journal of pediatric surgery*. 1986; 21(9):789-791. DOI: [https://doi.org/10.1016/S0022-3468\(86\)80368-2](https://doi.org/10.1016/S0022-3468(86)80368-2).
6. UNICEF: Bangladesh's child mortality rate drops by 73% in 25 years, DhakaTribune (Internet) , Published on 24th December 2017.
7. Hug L, Sharrow D, You D. Levels & trends in child mortality: Report 2017. Estimates developed by the UN Inter-agency Group for Child Mortality Estimation. 2017.
8. The 2030 Agenda for Sustainable Development, UNICEF and the SDGs. (7 September 2016) UNICEF. Available at: <https://www.unicef.org/agenda2030/69525>.
9. Baqui AH, Black RE, Arifeen SE et al. Causes of childhood deaths in Bangladesh: Results of a nationwide verbal autopsy study. *Bulletin of the World Health Organization*. 1998;76(2):161. PMID: PMC2305652.
10. Banu T, Chowdhury TK, Das SK et al. Birth Defects: A Hospital Based Study in Chittagong, Bangladesh. *Chattagram Maa-O-Shishu Hospital Medical College Journal*. 2014;13(3):5-10. DOI: <http://dx.doi.org/10.3329/cmshmcj.v13i3.20994>.
11. Henry JA, Abdullah F. Global Surgical care in the UN post-2015 sustainable development agenda. *World journal of surgery*. 2016; 40(1):1-5. DOI: <https://doi.org/10.1007/s00268-015-3249-4>.
12. Morris BJ, Wamai RG, Henebeng EB et al. Estimation of country-specific and global prevalence of male circumcision. *Population Health Metrics*. 2016; 14(1):4. DOI: <https://doi.org/10.1186/s12963-016-0073-5>.
13. Abantanga FA, Nimako B, Amoah M. The range of abdominal surgical emergencies in children older than 1 year at the Komfo Anokye Teaching Hospital, Kumasi, Ghana. *Annals of African medicine*. 2009;8(4). DOI: 10.4103/1596-3519.59578.
14. Bansal S, Banever GT, Karrer FM et al. Appendicitis in children less than 5 years old: Influence of age on presentation and outcome. *The American Journal of Surgery*. 2012; 204(6):1031-1035. DOI: <https://doi.org/10.1016/j.amjsurg.2012.10.003>.
15. Jablonski KA, Guagliardo MF. Pediatric appendicitis rupture rate: A national indicator of disparities in healthcare access. *Population health metrics*. 2005; 3(1):4. DOI: <https://doi.org/10.1186/1478-7954-3-4>.
16. World Health Organization. Male circumcision: Global trends and determinants of prevalence, safety and acceptability. 2008.
17. American College of Surgeons. Circumcision, appendectomy most common pediatric surgeries [Internet]. 14th April, 2015. Available at: <https://www.mdedge.com/acssurgerynews/article/98727/pediatrics/circumcision-appendectomy-most-common-pediatric-surgeries>.
18. USA Today. Hospital circumcisions down 10% over three decades [Internet]. Aug. 22, 2013. Available at: <https://www.usatoday.com/story/news/nation/2013/08/22/circumcision-infants-hospitals/2681253>.
19. McCahy P. Continuing fall in the incidence of acute appendicitis. *Annals of the Royal College of Surgeons of England*. 1994 Jul;76(4):282. PMID: PMC2502235.
20. Donnelly NJ, Semmens JB, Fletcher DR. Appendectomy in Western Australia: profile and trends, 1981-1997. *The Medical Journal of Australia*. 2001; 175(1):15-18.
21. Pearl RH, Hale DA, Molloy M et al. Pediatric appendectomy. *Journal of pediatric surgery*. 1995 1;30(2):173-81. DOI: 10.1016/0022-3468(95)90556-1.
22. Ghritlaharey RK, Budhwani KS, Shrivastava DK. Exploratory laparotomy for acute intestinal conditions in children: A review of 10 years of experience with 334 cases. *African Journal of Paediatric Surgery*. 2011; 8(1):62. DOI: 10.4103/0189-6725.78671.
23. Shiekh KA, Baba AA, Ahmad SM et al. Mechanical small bowel obstruction in children at a tertiary care centre in Kashmir. *African Journal of Paediatric Surgery*. 2010; 7(2):81. DOI: 10.4103/0189-6725.62852.