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Epidemiology and Clinical Spectrum of Pediatric Non-traumatic Surgical Emergencies

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Abstract

Background: Pediatric Non-traumatic Surgical Emergencies (PNTSE) are a major part of pediatric surgical emergencies associated with varied spectrum and high morbidity.

Aims: The aim of this study is to understand the clinical spectrum and epidemiology of PNTSE.

Methods: The children in the age group of 1 month to 14 years admitted in Pediatric Surgery Department in an emergency were studied retrospectively from Jan 2014 to Dec 2018. Children with h/o trauma were excluded.

Results: Total of 740 patients with PNTSE was admitted. The males were 65%. The females were 35%. Most of the patients (90%) presented within 48 hours of the appearance of symptoms. The vomiting and pain in the abdomen were the most common symptoms followed by fever, abdominal distension, blood in stools and diarrhea. The ultrasonography was the most common radiological investigation (89.5%) used followed by *X*-rays (11.4%) and Computed tomography scan (7%). Appendicitis was the most common diagnosis (30.8%) and Intestinal obstruction was the second most common diagnosis (20.3%) followed by abscess/cellulitis (7.8%). The conservative management was done in 24.6% cases. Rest of the cases required surgical intervention. The complications developed in 9.7%. There was a significant difference ($p \leq 0.0001$) in the occurrence of complications between patients getting admitted within 48 hours and after 48 hours of onset of symptoms as well as between the conservatively managed patients and the surgically managed cases. There were four mortalities. Average hospital stay was 5.19 days.

Conclusions: The PNTSE have a varied spectrum of presentation. The early diagnosis and appropriate intervention within 48 hours can decrease the complications. The patients undergoing surgical management have higher complications compared to those with conservative management. The PNTSE have a better outcome with the team approach involving Pediatric surgeon, Pediatric Anesthetist, Pediatric Intensivist and Radiologist.

Keywords: Pediatric non-traumatic surgical emergencies; Pediatric surgical emergency management.

Introduction

Pediatric Non-traumatic Surgical Emergencies (PNTSE) are a major part of pediatric surgical emergencies. Pediatric emergencies have overall increased morbidity and mortality as compared to elective surgical interventions. The challenge lies not only in the diagnosis but also stabilising the patient at odd hours in a developing country like India. The availability of resources in terms of advanced investigations and skilled clinicians may not be guaranteed round the clock.[1,2] The affordability of the parents to take the child to higher centre away from their living place and bear the medical cost is always questionable. The parents prefer the treatment at the nearest referral centre which may not be equipped with all the

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facilities. All the above factors lead to delay in the appropriate treatment causing varied spectrum of complications and high morbidity.[3] Therefore, it is really important to understand the clinical spectrum and epidemiology of PNTSE. Authors describe their experience in a Tertiary care centre located in a rural setup.

Materials and Methods

This was an Obseravtional Study. Epidemiological characteristics of all the children in the age group of 1 month to 14 years admitted in the department of Pediatric surgery in emergency were studied retrospectively from Jan 2014 to Dec 2018. Children with h/o trauma were excluded from the study. Neonates were also excluded from the study as neonates are affected by immediate afterbirth care. The neonatal physiological requirements as well as the type of surgical emergencies are drastically different from other age groups. The data collected and entered in MS Excel sheet for all the above patients from the hospital records under headings of age, gender, symptomatology, duration of symptoms before admission, signs, investigations ordered, diagnosis, management (surgical/non-urgical), hospital stay, outcome and complications. The data were compiled, refined, coded and recoded. Data were analyzed using SPSS version 19.0. The work has been reported in line with the Process criteria.[4]

Results

Total of 808 patients were admitted in emergency during the study period. Sixty eight (8.4%) patients were traumatic surgical emergencies and were excluded. Rest 740 (91.6%) patients were included as PNTSE. The males were 481 (65%). The females were 259 (35%). Age group distribution is as depicted in (Table 1).

Most of the patients (666 cases = 90%) presented within 48 hours of appearance of symptoms. Rest of the 74 cases (10%) presented after 48 hours of onset of symptoms. The vomiting (59%) and pain in abdomen (51%) were the most common symptoms followed by fever (33.2%), abdominal distension (12.2%), blood in stools (10.3%) and diarrhoea (7%). The ultrasonography was the most common radiological investigation (662 cases = 89.5%) used followed by *X*-rays (84 cases = 11.4%) and Computed tomography scan (52 cases = 7%) respectively. The special investigations like contrast upper or lower gastrointestinal series were done in only 14 cases = 1.9% of patients.

Appendicitis was the most common diagnosis (228 cases = 30.8%) and Intestinal obstruction was the second most common diagnosis (150 cases = 20.3%) followed by abscess/cellulitis (58 cases = 7.8%), obstructed/strangulated hernia (38 cases = 5.1%), hypertrophic pyloric stenosis (34 cases = 4.5%), bladder stones (18 cases = 2.4%) and other diagnosis (214 cases = 28.9%) (Table 2). Intussusception was the most common cause of intestinal obstruction (110 cases = 14.9%) followed by adhesive intestinal obstruction (22 cases = 2.9%). Intussusception was most common surgical emergency in the children up to 3 yrs of age. After 3 yrs of age, appendicitis was the most common diagnosis.

The conservative management was done in 182 (24.6%) cases. Rest of the 558 (75.4%) cases required surgical intervention. The complications developed in 72 cases (9.7%) (Table 3). Surgical site infection (52.7%) and sepsis (16.66%) were the most common complications in operated cases.

Seventy of these were in operated cases and two were in conservatively managed cases. Thirty seven of those had presented after 48 hours to the hospital. Rest of 35 cases were admitted and managed within first 48 hours of onset of symptoms. The Fisher's exact test was used to compare between Two Groups. It revealed that there was significant difference (p = < 0.0001) in the occurrence of complications between patients getting admitted within 48 hours and after 48 hours of onset of symptoms as well as between the conservatively managed patients and the surgically managed cases (Table 4).

There were four mortalities over the entire study period with two each from conservatively and surgically managed patients. All of them were admitted after more than 72 to 96 hours of onset of symptoms and there was a significant delay in seeking treatment due to varied reasons. The severe uncontrolled sepsis leading to multiorgan failure was the cause of death in all of them. Rest of the patients recovered and were discharged. Average hospital stay was 5.19 days.

Table 1: Age group distribution

Age Group	Male	Females	Total
> 28 days to 1 year	163 (3 deaths)	71 (1 death)	234
> 1 year to 3 years	78	38	116
> 3 years to 5 years	40	10	50
> 5 years to 14 years	200	140	340
Total	481	259	740

Table 2: Diagnosis

Diagnosis	Number	Percentage
Appendicitis	228	30.8%
Intestinal Obstruction	150	20.3%
Abscess/Cellulitis	58	7.8%
Obstructed/Strangulated Hernia	38	5.1%
Hypertrophic Pyloric Stenosis	34	4.5%
Bladder stones	18	2.5%
Other diagnosis	214	29%

Table 3: Complications

Complications	N (%)
Surgical site infections	38 (52.7)
Sepsis	12 (16.7) (4 Deaths)
Adhesive Intestinal obstruction	8 (11.1)
Perforation during hydrostatic reductions	4 (5.5)
Others	10 (14)
Total	72

Table 4: Management

Management	N	Complications	Fischer exact test value
Conservative	182(24.6%)	2	$p < 0.00001$
Surgical	558(75.4%1)	70	
Time of Hospital admission	N	Complications	
Earlier than 48 hours	666(90%)	35	$p < 0.00001$
Later than 48 hours	74(10%)	37	

Discussion

The Pediatric surgical emergencies both traumatic and non-traumatic, have always challenged the Pediatric surgeons and Pediatricians. The outcome of pediatric surgical emergencies is known to have increased mortality and morbidity as compared to routinely planned elective surgeries. The outcome is also affected by delay in presentation and diagnosis in developing countries due to far placed tertiary care centres and lack of infrastructure.[1–3,5]

The epidemiological characteristics of our study showed male to female ratio of 1.8:1. The proportions of children admitted in infantile and school going age group were significantly higher as compared to toddlers and preschool children. The appendicitis was the most common cause of PNTSE in our study overall followed by intestinal obstruction. Although, in younger age group of infants and toddlers, intestinal obstruction was the most common cause with diagnosis being intussusception, hirschsprung's disease followed by obstructed hernia. Pepper VK et al. also noted appendicitis and intussusception as the most common causes of surgical abdominal pain.[6] The several other studies have reported intestinal obstruction as a most common cause of PNTSE.[1,2,5] The most of the patients in our study (90%) presented to hospital seeking within 48 hours of onset of symptoms which indicates increased outreach of referral centres in rural India. This is in sharp contrast with the other developing countries.[5]

The major investigation used was Ultrasonography corresponding with the higher incidence of appendicitis and intussusceptions followed by *X*-rays. The use of CT scan and contrast study was done in few cases (< 10%) shows the efficiency with which PNTSE can be managed with basic Ultrasonography and *X*-ray. The Ultrasonogrpahy was also useful as a procedure tool for hydrostatic reduction of intussusceptions in 110 cases. This underlines the dependence on ultrasonography and *X*-ray abdomen for successful management of PNTSE.

Once the diagnosis was established, the ratio of cases requiring surgical *vs* conservative management was 3:1. The large number PNTSE requires surgical management mandates the presence of well-equipped surgical facilities with availability of pediatric surgeon and pediatric anesthetist. The bulk of the conservatively managed cases were formed by intussusception patients for whom ultrasonography guided hydrostatic reduction were done with the help of a radiologist.

The overview of complications in our study underlined the fact that surgically managed patients can be anticipated to have both major and minor complications. The surgical site infection was the most common complication followed by sepsis and adhesive intestinal obstruction. The complications incidence was significantly higher in those patients admitted later than 48 hours to the hospital as compared those who were admitted within first 48 hours of symptom onset. Timely presentation within 48 hours to the hospital leading to early diagnosis and management has been described as an important factor in decreasing mortality and morbidity.[3,5,7] We had four mortalities due to severe sepsis causing multiorgan failure. The pediatric intensivist has always a significant role to optimise the patients preoperatively and for the management of sepsis in postoperative patients.

The outcome of PNTSE patients in our study was better with only four mortalities. The complication rate was high around 10%, but we hope to decrease

the same by avoiding delay in diagnosis and definitive management. The model of having Pediatric surgeon, Pediatric anesthetist, Pediatric intesivist and ultrasonologist would suit better for a referral centre in rural India to manage PNTSE. The above model has helped us to overcome difficulties in PNTSE as compared to other studies.[2,3,5] The average hospital stay of 5.19 days found in our study has also been inspiring in already stretched healthcare system.

Conclusion

The PNTSE have varied spectrum of presentation. The early diagnosis and appropriate intervention within 48 hours can significantly decrease the complications. The Sepsis and delay in receiving tertiary level care can be an important cause of mortality. The patients undergoing surgical management can be anticipated to have higher complications compared to those who require conservative management. The PNTSE have better outcome with the team approach involving Pediatric surgeon, Pediatric anesthetist, Pediatric intensivist and Radiologist.

Conflicts of Interests: None.

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