

A Study on Assessment and Management of Pediatric Abdominal and Thoracic Trauma at A Tertiary Care Center

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Abstract

Introduction: Trauma is the third most common cause of death in children below the age of 14 years worldwide. Systematic management of an injured child is essential to reduce trauma-related mortality. Differences between children and adults concerning patterns of injury, physiological presentation, and management must be understood by the treating surgeon to address the special needs of the paediatric age group.

Materials and Methods: The present study is a prospective observational study conducted in the Department of Pediatric Surgery, Niloufer Hospital, over a period of two years.

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A total of 231 cases with blunt trauma to the chest and abdomen were collected from the trauma registry and prospectively studied based on a trauma questionnaire and treated according to ATLS protocols. The final statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS software).

Results: Of the 231 cases, most abdominal and/or chest injuries were observed in the 3–6-year age group, with boys aged 6–9 years being more commonly affected. Forty-five percent of injuries were due to road traffic accidents, followed by falls from height. Twelve percent of cases presented to the department after 48 hours. The abdomen was the most common site of injury, with the liver being injured in 25% of cases, most of which were managed conservatively. Overall, 30% of the cases underwent intervention in the form of surgery or tube thoracostomy placement. The study reported a 2% mortality rate.

Keywords

- Abdominal trauma
- Thoracic trauma
- Liver laceration
- Splenic injury

Conclusion: Traumatic injuries, being a major health problem, require a well-structured trauma registry system and strict protocol-based management tailored to the epidemiology and resource setting. This approach would benefit the treating surgeon, the injured child, and potentially the nation as a whole. Proper triage and trauma management can significantly reduce the burden.

Introduction

Trauma is the greatest threat to life among all diseases in the pediatric population. It imposes not only an enormous financial,

emotional, and social toll on injured children and their families but also on society. Every year, approximately

875,000 children are killed, and nonfatal injuries affect the lives of between 10 million and 30 million more globally.

In India, over 90% of injuries are caused by blunt trauma, and seriously injured children often suffer from multiple injuries. Head injury is present in most cases and accounts for 75% of deaths. In infants, non-accidental injury is most prevalent, whereas for toddlers, falls are the predominant injury mechanism. In older children, road traffic accidents and sports injuries predominate. Whether this is indeed the case regarding blunt thoracic and abdominal trauma will be studied in the present research.

Prompt identification of potentially life-threatening injuries and proper assessment of the mechanism and extent of trauma, according to the Advanced Trauma Life Support (ATLS) protocol, are necessary. Furthermore, survival in this age group can be improved through prevention strategies such as education, social awareness, and behavior modification. Hence, the present study aims to review the assessment and management of pediatric thoracic and abdominal trauma at a tertiary care center.

Materials and Methods

The present study is a prospective observational study conducted in the Department of Pediatric Surgery, Niloufer Hospital, from March 2021 to March 2023. Over this two-year period, 231 cases of blunt trauma to the abdomen and/or thorax were presented to the emergency room and registered in the trauma registry maintained by our department.

All children under the age of 14 years with abdominal and/or thoracic trauma were included in the study. Children under 14 years with polytrauma, orthopedic injuries, and intentional injuries such as child abuse and sexual assault were excluded. Children who absconded before completing treatment for blunt abdominal and/or thoracic trauma were also excluded. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS software).

Among the 231 cases diagnosed with blunt abdominal and/or thoracic trauma, those who were hemodynamically unstable were stabilized by initial resuscitation following ATLS protocols. After resuscitation, a detailed clinical history was obtained from a reliable informant using a pre-prepared questionnaire, which included:

1. Age at presentation

2. Sex at presentation
3. Place of injury
4. Mode of injury
5. Time of presentation
6. Region involved in the injury

All cases were examined for symptoms and signs of abdominal and thoracic injuries. Routine laboratory investigations — including complete blood count, renal and liver function tests, electrolyte estimation, and coagulation profile — were performed for all patients.

Hemodynamically unstable cases underwent chest X-ray, erect abdominal X-ray, and bedside FAST (Focused Assessment with Sonography in Trauma) scan by an emergency physician. All FAST-positive cases were taken up for laparotomy and operated on accordingly. FAST-negative cases underwent CT assessment of the abdomen and/or chest as relevant for further evaluation.

Hemodynamically stable cases underwent chest X-ray, erect abdominal X-ray, and abdominal ultrasound assessment by a radiologist. Findings were documented.

Cases with chest X-ray suggestive of air, fluid, or fractures underwent tube thoracostomy as necessary. Cases with erect abdominal X-ray suggestive of pneumoperitoneum underwent either laparotomy or diagnostic laparoscopy as required. Based on ultrasound findings, CT of the abdomen and/or chest was performed as relevant.

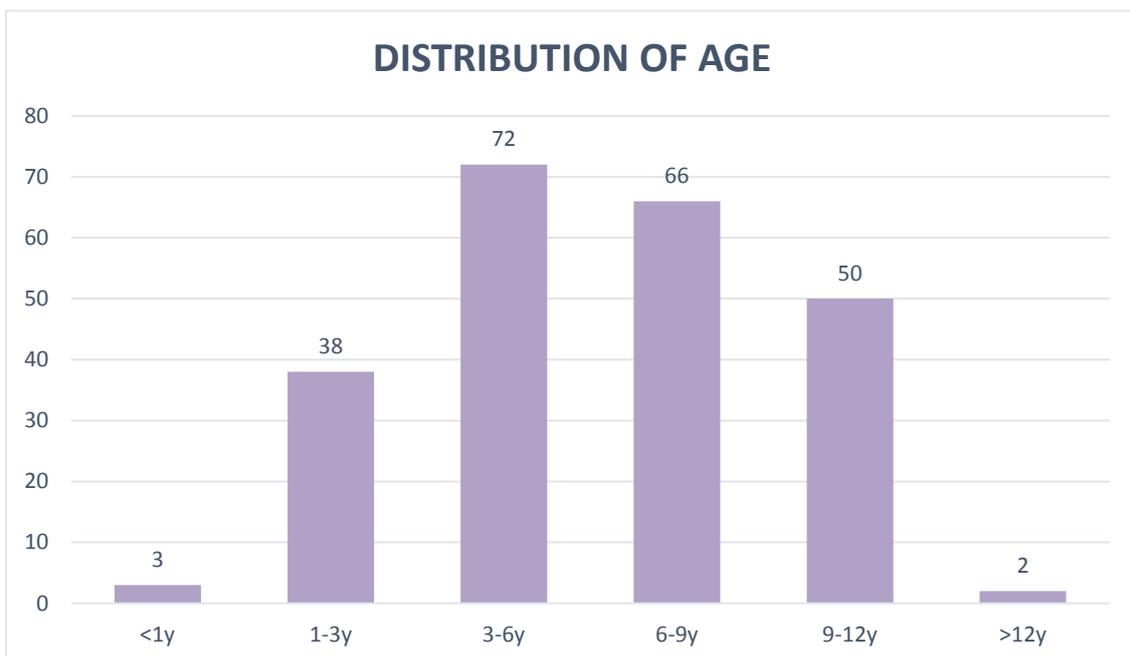
The overall duration of hospital stay was analyzed. Finally, the outcome of the injury was assessed against various parameters.

Result

From March 2021 to March 2023, 231 trauma cases were presented to the Emergency Room, Department of Pediatric Surgery, Niloufer Maternal and Child Health Care. These cases were studied prospectively, and the results were recorded.

Table 1: Age Distribution

Age Group	No.of Patients	Percentage
<1y	3	1%
1-3y	38	16%
3-6y	72	31%
6-9y	66	29%
9-12y	50	22%
>12y	2	1%
	231	

**Figure 1:** Age Distribution

Most of the injuries to the abdomen and/or chest were seen in the age group of 3-6 yr followed by 6-9 yr. The median age in the

study group was 7 years. The mean age of presentation in our study was 6.75.

Table 2: Sex Distribution

SEX	No.of Patients	Percentage
Male	161	70%
Female	70	30%
	231	

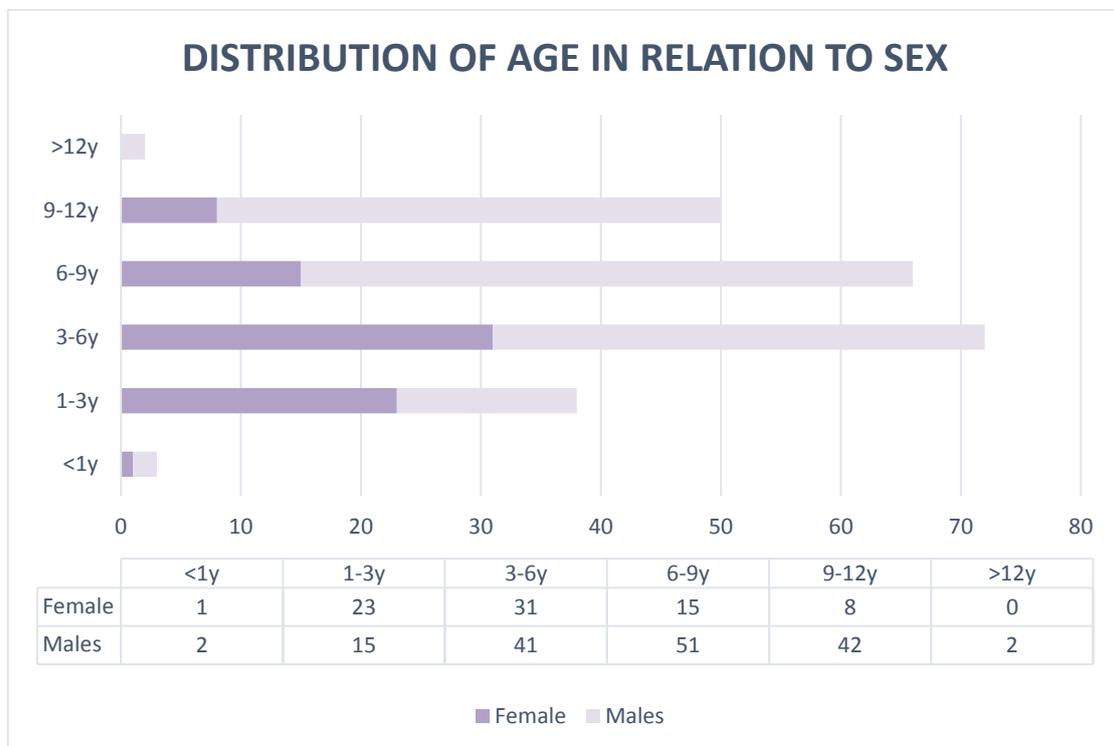


Figure 2: Distribution of Age in Relation to Sex

Male children (70%) were the most common injured group compared to female

children (30%). Most commonly the boys in the age group of 6-9 years were injured.

Table 3: Distribution of Mechanism of Injury

Mechanism of Injury	Male	Female	Total	Percent
RTA	72	33	105	45%
Fall	62	35	97	42%
Handle Bar	25	1	26	11%
Bull gore injury	2	1	3	1%
			231	

The most common mechanism of injury were road traffic accidents (45%) followed by fall from height (42%).

Table 4: Distribution of Different Mechanisms of Injury

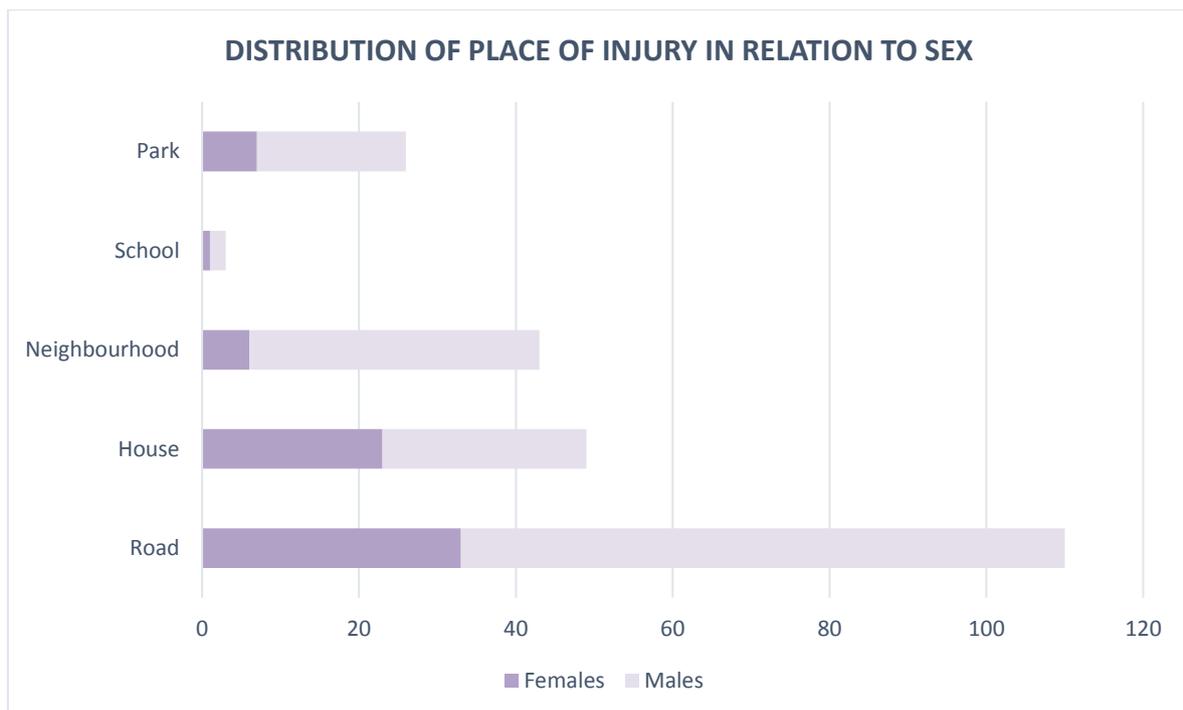
Injury mechanism	Female	Male	Total
RTA – 45%			
1. Pillion rider	12	28	40
2. Self-driving a two-wheeler	0	3	3
3. While playing on the road	8	20	28
4. While walking on the street	7	17	24
5. End on vehicle collision	6	4	10
FALL – 42%			
1. Fall from bed/cradle	2	4	6
2. Fall from building	1	5	6
3. Fall from chair/table	6	15	21
4. Fall from roof	1	7	8
5. Fall from stairs	8	3	11
6. Fall from a tree	3	7	10
7. Fall on level ground	14	21	35
BULL GORE INJURY – 1%	1	2	3
HANDLEBAR INJURY – 11%	1	25	26

Of the Road traffic accidents, most injuries occurred due to pillion riders (38%) i.e., when the child was travelling either on a

two/three/four-wheeler. Among the falls, most injuries were due to falls on level ground while playing.

Table 5: Distribution of Place of Injury

Place of Injury	Females	Males	Total
Road	33	77	110
House	23	26	49
Neighborhood	6	37	43
School	1	2	3
Park	7	19	26

**Figure 3:** Distribution of Place of Injury in Relation to Sex

The road is the most common place of injury followed by the house. Of these, most injuries occurred in the age group of 6-9 years (60%).

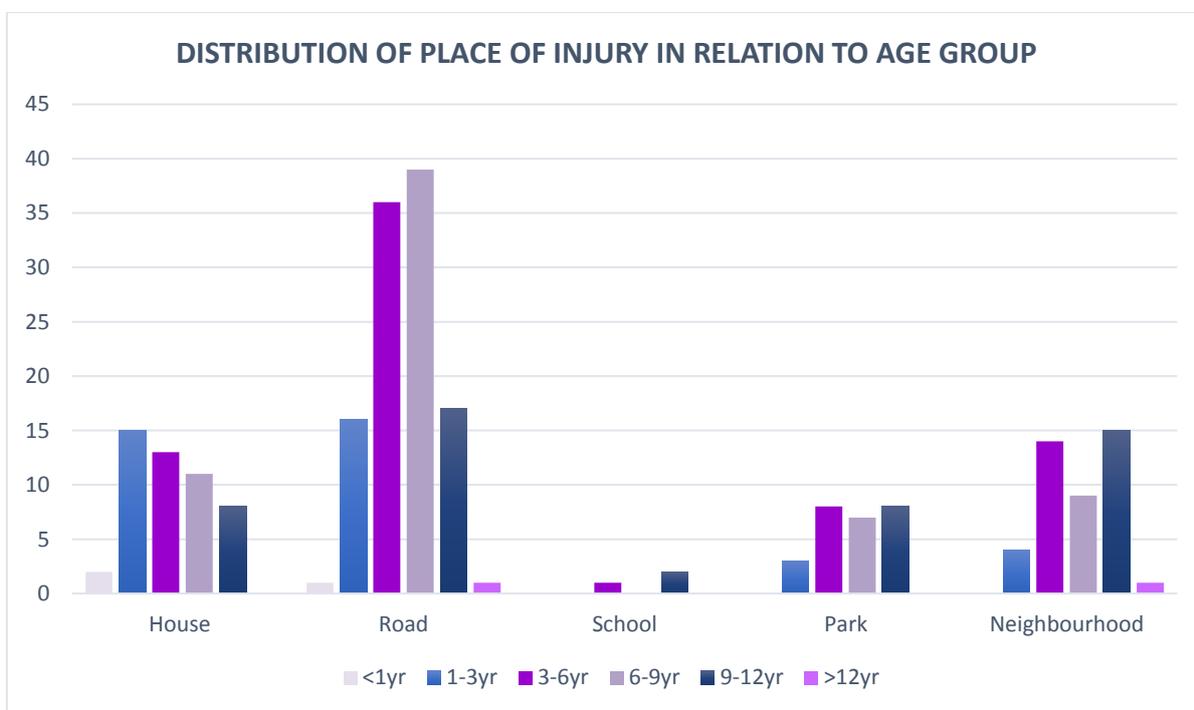


Figure 4: Distribution of Place of Injury in Relation to Age Group

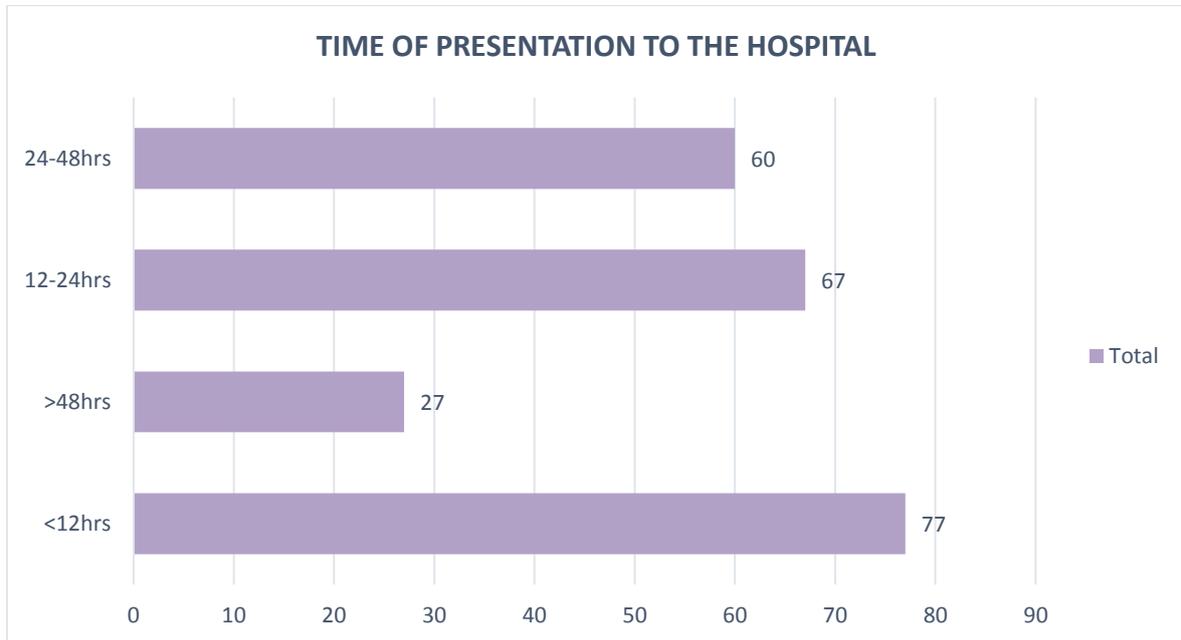


Figure 5: Distribution of Period of Latency

33.3% of the cases were presented to the department within 12hrs of injury.

However, a delay of >48hrs was noted in 12% of cases.

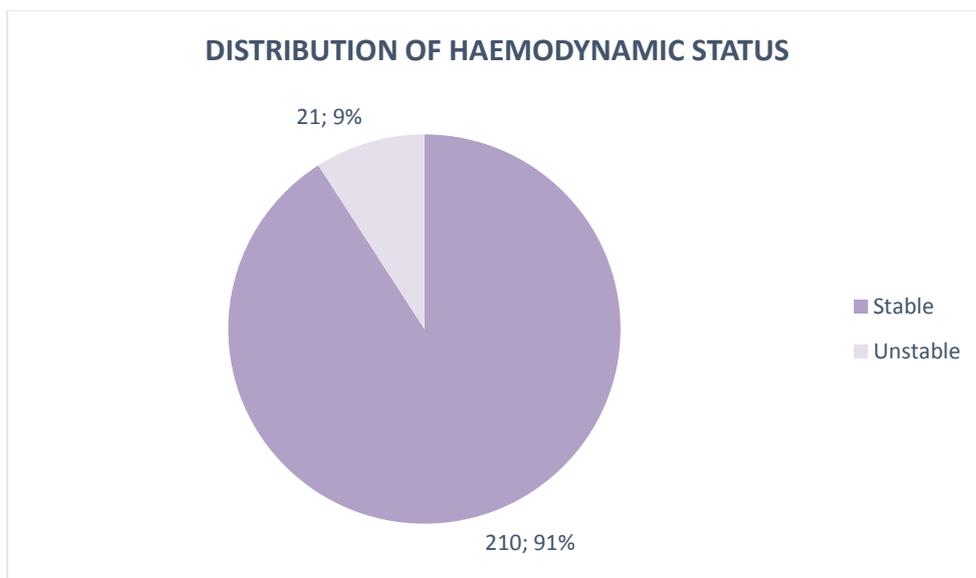


Figure 6: Distribution of haemodynamic status

91% of cases presented to the department in a hemodynamically stable condition, but 9% of cases presented with hemodynamic instability.

INVESTIGATIONS:

Based on the Hemodynamic status, 9% of unstable cases underwent Chest X-ray, FAST Scan, and X-ray ERECT abdomen and the statistics were as below – Of the

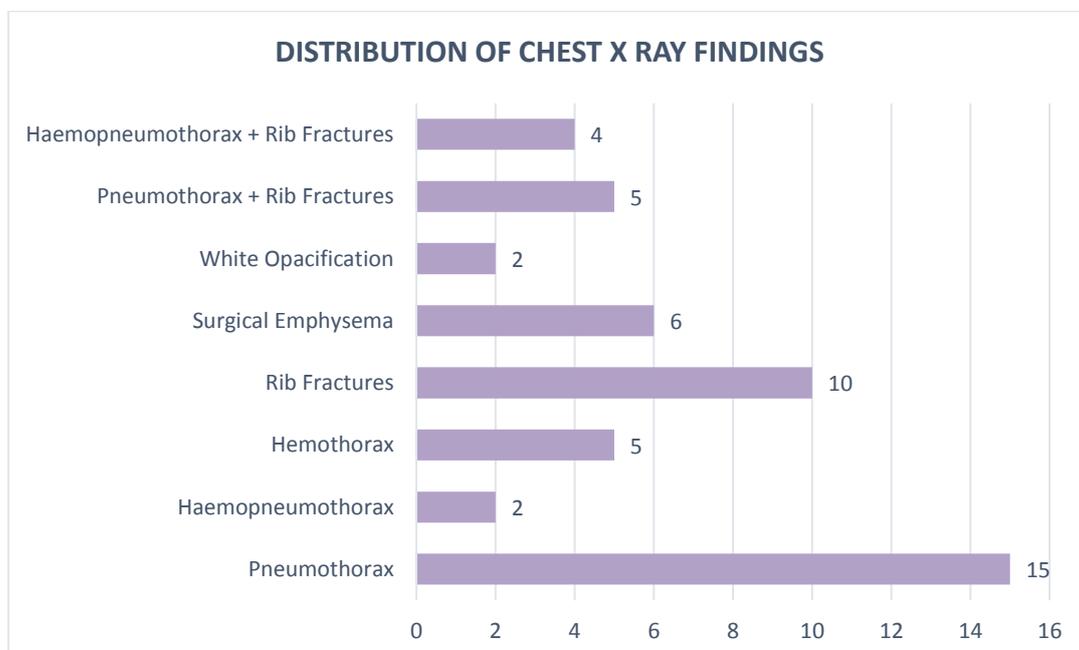
91% of stable cases, all cases underwent Chest X-ray and upright abdominal X-ray routinely on arrival. However, Ultrasound Abdomen was done in 87% of cases. Of the rest 30 (13%) cases where an ultrasound abdomen was not done, 21 (9%) cases were unstable and out of the 9 (4%) cases, 3 cases underwent laparotomy based on CT abdomen findings and 6 cases underwent laparotomy based on upright abdominal X-ray findings.

Table 6: Distribution of Investigations Underwent by Haemodynamically Unstable Children

Hemodynamic Status	Un-stable (21)
Chest X-ray – 21 (9%)	
Positive	8
Negative	13
FAST Scan – 20 (8%)	
Positive	6
Negative	14
X-ray ERECT Abdomen – 21(9%)	
Positive	11
Negative	9
Treatment Given	
Operated	14
Tube Thoracostomy	8
Outcome	
Mortality	5

Table 7: Distribution of Investigations Underwent by Haemodynamically Stable Children

Haemodynamic Status	(210) Stable
Chest X-ray – 210 (91%)	
Positive	41
Negative	169
Upright abdominal X-ray – 210 (91%)	
Positive	34
Negative	176
USG Abdomen – 201 (87%)	
Positive	93
Negative	73
Inconclusive	35
Treatment Given	
Operated	32
Tube Thoracostomy	20

**Figure 7:** Distribution of Chest X-Ray Findings Role of Ct Abdomen in Diagnosing Blunt Abdominal Injuries.

As reported previously, 74% of cases underwent CT scans. Of these, 77% of cases showed positive findings on CT

scans. And of these cases, 17% cases were operated.

Table 8: Distribution of Ct Abdomen Findings

CT Abdomen	Stable	Unstable	Total
Positive	127	5	132
Negative	39	0	39
Not done	44	16	60
Total	210	21	231

Table 9: Distribution of Ct Findings in Relation to Management of Injury

CT abdomen	Operated	Conservative	Total
Positive	23	109	132
Negative	0	39	39
Total	23	148	171

In all cases with suspected injury to the abdomen, chest CT was performed as a

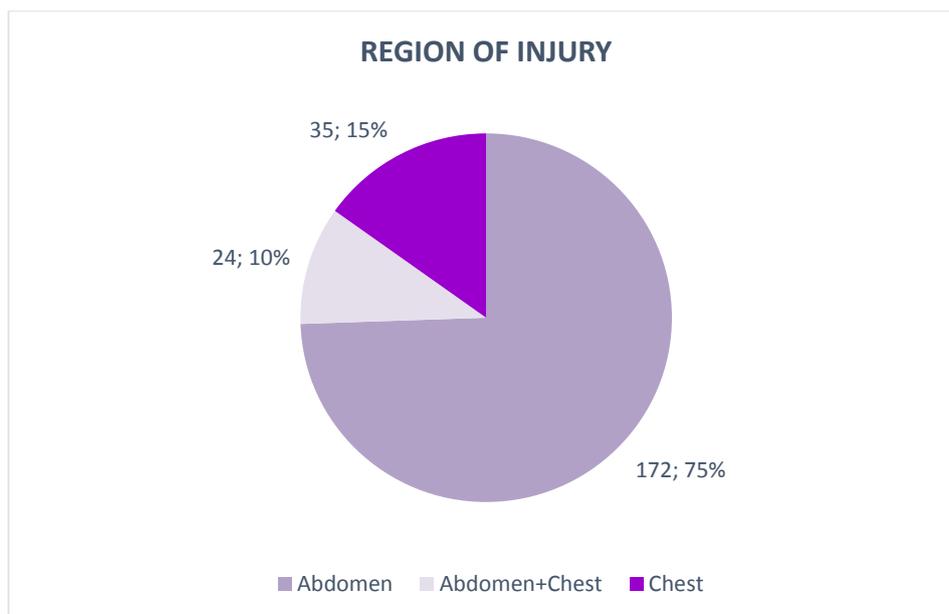
routine along with an abdominal CT to confirm other injuries.

Table 10: Distribution of Chest Ct Findings

Chest CT	Stable	Unstable	Total
Positive	40	5	45
Negative	39	0	39
Not done	131	16	147
Total	210	21	231

Table 11: Distribution of Region of Injury

Region of Injury	No.of Patients
Abdomen	172
Abdomen+chest	24
Chest	35
Total	231

**Figure 8:** Distribution of Region of Injury

The abdomen (75%) constitutes the most common region of injury in the present study.

Pattern of injury:

Among all the abdominal injuries, the pattern of injury was as follows the most common solid organ injured in our study was the Liver (25%) followed by Spleen (24%). Most of the solid organ injuries

were Grade 2/3 injuries. Among the Hollow Viscus Injuries, the distribution was as follows Among the Thoracic Injuries, the pattern of injury was as follows of the 26% of cases with chest injuries, lung contusions were the most common type accounting for 32% of the cases, of which unilateral involvement was most frequent.

Table 12: Distribution of Different Patterns of Abdominal Injury

Solid organ injuries						
Organ of injury	Total	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Liver	49	5	17	14	12	1
Spleen	48	6	14	15	7	5
Renal	9	2	3	3	0	1
Pancreas	8	0	4	3	1	0
Solid organ + other assoc injuries	20	0	9	9	1	1
Hollow viscus	21	2	9	5	3	1
Pelvic organ injuries						
Ovary	1					
Bladder	3	1		1	1	
Miscellaneous						
Rectus sheath haematoma	1					
The evisceration of small bowel	1					
No obvious injury	35					
	197					

Table 13: Distribution of Hollow Viscus Injuries

Hollow Viscus	Total (21)
Jejunum	9
Ileum	6
Duodenum	3
Gastric	1
Colon	1
Small Bowel Evisceration	1

Table 14: Distribution Different Patterns of Thoracic Injury

Thoracic Injuries	Isolated Chest	Combined Abdomen + Chest	Total
Lung Contusions	7	5	12
Lung Contusions + Pneumothorax	2	2	4
Lung Contusions + Rib Fractures	2	1	3
Pneumothorax	6	5	11
Pneumothorax + Rib Fractures	4	1	5
Haemopneumothorax	2	0	2
Haemopneumothorax + Rib Fractures	3	1	4
Haemothorax	2	3	5
Rib Fractures	4	3	7
Surgical Emphysema	3	3	6
Total	35	24	59

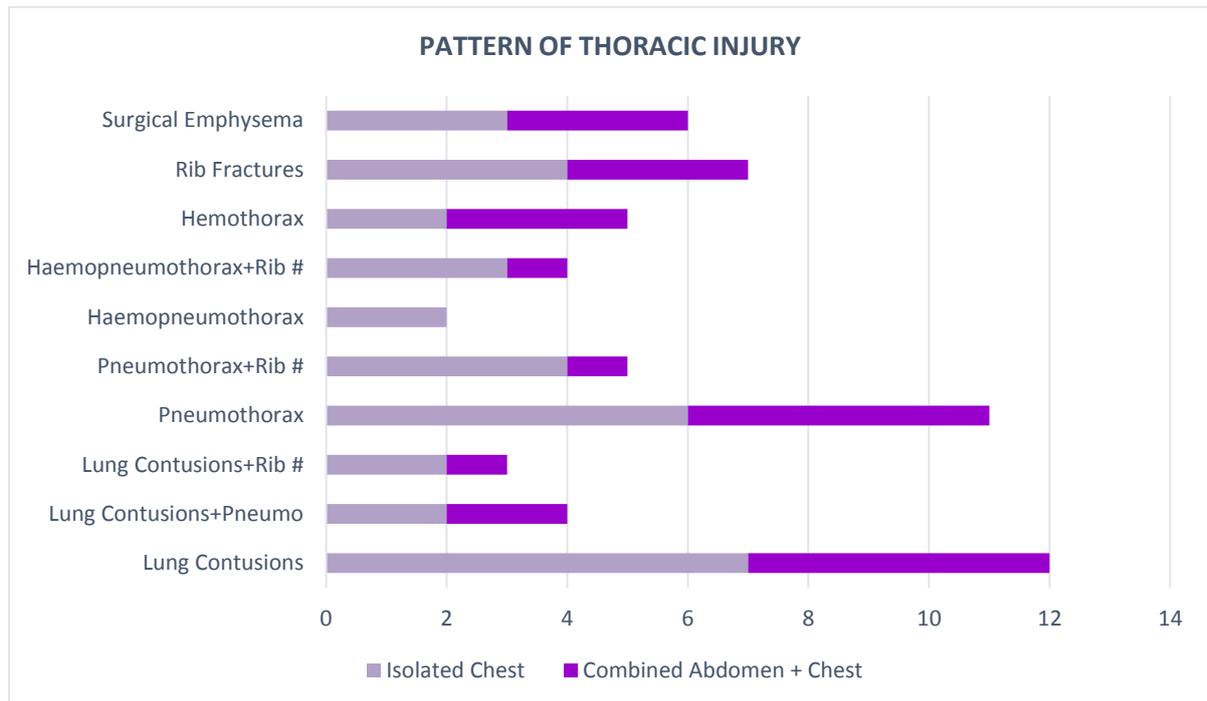


Figure 9: Distribution of Different Patterns of Thoracic Injury

Overall, 30% of the cases underwent intervention in the form of surgery or tube thoracostomy placement. Different treatments given for the different patterns of thoracic injury were as follows 47.4% of cases of thoracic trauma needed a tube thoracostomy, of which cases with pneumothorax underwent 50% of thoracostomy tube placement and 45% of

the lung contusions underwent conservative management.

All the Injuries with no Obvious Injury, which on Ultrasound suggested either free fluid or hemoperitoneum with no obvious solid organ injury on abdominal CT, were managed conservatively. Among the solid organ injuries, 57% of the cases were managed conservatively.

Table 15: Distribution of Various Interventions Performed

Region of Injury	Operative/Intervention	Conservative	Total
Abdomen	40	132	172
Chest	17	18	35
Abdomen+Chest	12	12	24
	69	162	231

Table 16: Distribution of Treatment Strategies Followed in Thoracic Trauma

Chest Injuries	Tube Thoracostomy	Conservative	Total
Lung Contusions	1	11	12
Lung Contusions + Pneumothorax	4	0	4
Lung Contusions + Rib Fractures	0	3	3
Pneumothorax	10	1	11
Pneumothorax + Rib Fractures	4	1	5
Haemopneumothorax	2	0	2
Haemopneumothorax + Rib Fractures	4	0	4
Haemothorax	3	2	5
Rib Fractures	0	7	7
Surgical Emphysema	0	6	6
	28	31	59

Table 17: Distribution of Treatment Strategies Followed in Abdominal Trauma

Treatment Given	No.of Patients
Liver	44
Conservative	38
Total Peritoneal lavage + Drain Placement	6
Spleen	42
Conservative	37
Splenectomy	5
Renal	9
Conservative	8
Nephrectomy	1
Pancreas	6
Conservative	2
Endoscopic Cystogastrostomy	1
Total Peritoneal lavage + Drain Placement	3
Hollow Viscus	18
Abdominal wall repair	1
Closure of Perforation	8
Resection and anastomosis	6
Total Peritoneal lavage + Drain Placement	3
Bladder	3
Bladder Repair + Suprapubic Catheterisation	2
Conservative	1
Solid Organ + Other assoc Injuries	17
Conservative	15
Splenectomy	2
Miscellaneous	
Ovary – Oopherectomy	1
Mesentery - Mesenteric Tear Closure	1
Rectus muscle haematoma - Conservative	1
No Obvious Injury - Conservative	30
Total	172

The Hollow Viscus Injuries were treated as follows

Table 18: Distribution of Treatment Strategies Followed in Hollow Viscus Injuries

Hollow Viscus Injury	No. of Patients
Jejunum	9
Closure of Perforation	5
Operated	2
Resection & Anastomosis	1
Total Peritoneal Lavage + Drain Placement	1
Ileum	6
Closure of Perforation	1
Operated	1
Resection & Anastomosis	4
Duodenum	3
Closure of Perforation	1
Total Peritoneal Lavage + Drain Placement	2
Colon	1
Resection & Anastomosis	1
Gastric	1
Closure of Perforation	1
Small Bowel	1
Abdominal wall repair	1

Overall Mortality in our study was 2%. All five children who died were hemodynamically unstable at presentation.

The data of the fatalities in our study was as follows

Table 19: Distribution of Mortality

Age/Sex	Time of presentation	Mechanism of Injury	Place of Injury	Region involved	Type of Injury	Treatment Given
11y/M	24-48hrs	Fall from height	School	Abdomen	Grade 3 Pancreatic injury	Total peritoneal lavage + Drain Placement
4y/F	>48hrs	RTA	Road	Abdomen	Grade 5 Ileal injury	Resection and anastomosis
4y/F	>48hrs	RTA	Road	Abdomen	Grade 2 Duodenal injury	Closure of Perforation
7y/M	24-48hrs	RTA	Road	Chest	B/L Haemopneumothorax + Rib Fractures	ICD placement
12y/F	12-24hrs	Fall on level ground	Park	Abdomen + Chest	Grade 4 Jejunal injury and B/L Haemopneumothorax + Rib Fractures	Resection and anastomosis ICD placement

Discussion

Accidental injuries in the pediatric population are on the rise and have become an important social problem. Injuries account for about 12% of the disease burden worldwide and place a disproportionate burden on countries with limited resources. Many children who survive trauma may develop a temporary or permanent disability, requiring continuing

care and having a significant impact on their psychosocial health and financial burden⁴. In our prospective observational study of paediatric trauma from a tertiary care centre in South India, we highlight the importance of mitigating trauma to the torso in the pediatric age group.

A total of 231 children with injuries to the abdomen and/or chest were evaluated in our study. The most common age group

injured in our study was 3-6 years (31%) with the mean age of presentation being 6.75 years. A study done by Prakash et. al., in South India, reported similar findings with 27% injured children in the age group of 3-6 years⁵. In another study from Oman, Bhatti et.al. reported that the incidence of trauma was high among the age group of 6-12 years (44.3%)⁶.

Male children are usually more affected by blunt trauma. This is because male children are given more freedom, opportunities, and facilities than females in all aspects of our society. Likewise, they are more exposed to potential risk factors and potential environments suitable for trauma such as playing on roads, rooftops, trees, or near construction sites. Our study reports 70% of cases of male children with trauma to the abdomen and/or chest. Kundal et.al.,⁷ Prakash et. al.,⁵ and Bhatti et.al.,⁶ also report the same scenario in terms of sex distribution.

Road (48%) was the most common place of injury in our study. Road traffic accidents are the most common mechanism of injury in our study (45%). The trauma commonly occurred when the child was a passenger either on a two/three/four-wheeler (17%) in our study. This is followed by fall injuries (42%). Of the fall injuries, most were due

to falls on level ground (36%). This was contrary to Prakash et.al., who reported that fall injuries were more common than Road traffic accidents⁵. Different studies from other parts of the world reported that falls were the predominant mode of injury followed by RTAs. On the other hand, a study from New Delhi reported that RTA was the most common mode of injury followed by falls and burns⁸. Another study done in Madhya Pradesh by Sharma et.al. reported that fall from height was the leading mode, followed by RTAs and burns⁹. This shows that prevention of road traffic accidents can significantly reduce the incidence of trauma in children.

33% of cases presented to the department within 12hrs. 12% of cases presented late i.e., beyond 48hrs which could be due to either lack of parental education, delay in identifying the trauma, or no proper resources at primary health care centres before reaching the tertiary care centre. The lesser the delay, the early the treatment and the better the prognosis. In a study by Prakash et.al., most of the injuries reached the hospital within 1-6 hours⁵.

Demographic factors like age, gender, place of injury, mechanism of injury, and time of presentation play a vital role in identifying the type and pattern of injury

and the early intervention of injury. Sharma *et al.* concluded that by knowing the epidemiological parameters of pediatric trauma, a majority of injuries are preventable⁹. Thus, injury prevention programs for the pediatric population will help greatly in modifying the above factors in the causation of trauma. The high incidence of injuries on roads and due to falls indicates the need for more supervision during playing and identifying risk factors for injuries.

Road safety measures should be taught to children through School-based programs with cartoons and comic characters on a regular basis. Parents also should be counselled regarding road safety measures. Active participation of children in these programs can keep the momentum up to prevent pediatric road injuries. Play areas and children's parks should be encouraged and properly walled to prevent injuries. A significant proportion of fall-related injuries in younger children resulted from unsafe work-related activities in our study. In the developing scenario, Child labour although appears reduced, should be addressed and worker safety norms need to be implemented strictly. Thus, epidemiological parameters make a useful tool to identify the burden of injuries. A

more detailed and comprehensive trauma registry in the Indian scenario seems to be important for formulating policies to reduce the pediatric trauma burden.¹⁰

Hemodynamic instability indicates an intra-abdominal or retro-peritoneal bleed which if not detected and adequately resuscitated will result in the death of the patient. In our study, after arrival, the hemodynamic status was confirmed, and the child was assessed according to the ATLS protocols. There were 9% of hemodynamically unstable cases in our study. Hemodynamic instability hinders the proper and complete preoperative evaluation of the patient and thus diagnostic laparoscopy, and laparotomy are justified in cases presenting with unexplained hypotension without any other investigation.

At an initial presentation, after the primary survey, X-ray Erect and Chest X-rays were performed on all injured children in our study, because they were simple, quick, available at ease and could be performed alongside resuscitation. As their specificity approaches 100% in most studies, these tend to decrease the delay in early surgical intervention in case of hemodynamic instability and hollow viscus injuries.

Bedside FAST scan was done in 9% of cases of the study who were hemodynamically unstable. According to Long MK et.al., the sensitivity and specificity of FAST in the early identification of injury were 59.5% and 84.3% respectively¹¹. Further, FAST improves the ability to predict the need for early surgical intervention, especially in the case of hemodynamically unstable children¹². Thus, we recommend FAST as an eminent protocol to avoid unnecessary delay in treating trauma-related injuries, especially in hemodynamically unstable children.

However, a detailed Ultrasound examination was performed in stable patients to reduce the radiation exposure due to the CT scan. However, its role in deciding the grade of solid organ injury is questionable. The low reliability of ultrasound findings and operator-dependent variation of the findings, make CT scan the primary diagnostic modality, especially in the case of hemodynamically stable children with torso trauma. However, the concern of cost and potential for radiation exposure limits its use¹³.

The Pediatric Emergency Care Applied Research Network (PECARN) proposed a clinical decision rule to avoid CT scans in

children who are at very low risk for clinically important intra-abdominal injuries (CIIAI). Although cost-effective, the validity of this Clinical decision rule still requires further research. Nevertheless, CT scans were effective in the exclusion of potential intra-abdominal or pelvic sources of blood loss and the detection of additional injuries, which may change the management protocol of children with torso trauma¹⁴. Hence, a CT scan should be reserved for cases where the absence of intra-abdominal injury cannot be ruled out.

In our study, the abdomen (74%) was the most common region involved in injuries. The liver (25%) and spleen (24%) were the most common solid organs injured. Jejunum was the most common perforated hollow viscus organ (43%). Similar findings were reported by Kundal et.al²⁹. Among the thoracic injuries, Isolated Lung contusions were the most common pattern observed in our study. Although lung contusions were the most common injury, most injuries were not identified on a Chest X-ray. This was in accordance with Piyush K. Sinha et al¹⁵. These findings imply that lung parenchymal injuries can occur most commonly due to the greater pliability of the rib cage in children; furthermore, such

injuries can be missed on initial chest X-rays.

In our study, all thoracic injuries were managed conservatively or by chest intubation. Piyush K. Sinha et al reported that the most common intervention for children with blunt thoracic trauma was chest intubation.¹⁵ In our study, there was no requirement for thoracotomies. Currently, non-operative management of solid organ injuries is the primary goal in stable children with blunt trauma. All the injuries were classified according to the AAST (American Association for the Surgery of Trauma) injury scoring scales in our study and treatment protocols were framed accordingly. In our study, 57% of children with single or multiple solid organ injuries were managed successfully through a conservative approach. The reasons for the high success rate of conservative management in our study could include the availability of support, blood and blood products received by the patients in the PICU. However, isolated pancreatic injuries, hollow viscus injuries and grade five solid organ injuries required surgical intervention because of the trauma-related ongoing infection and bleeding.

There was 2% mortality in our study. This could be due to delay in the presentation of injury and severity of injury. The delay in presentation could be attributed to the ignorance of the parents, the poor referral system and the resources at the primary health care level.

Conclusion

Traumatic injuries remain a major public health problem in India. They contribute a substantial proportion of all paediatric surgical admissions at a high-volume tertiary care centre. Pre-hospital emergency care at the primary care centre level should be developed, and also be able to handle children; primary paediatric trauma hospitals need to be specially equipped to handle low-grade abdominal and chest injuries in infants and small children—as these are the most common injuries. The primary care physician also should be trained in bedside procedures and tube thoracostomy. Finally, a trauma registry system and strict protocol-based management of injuries according to the concerned epidemiology and resource setting would be beneficial for the treating surgeon, injured child and perhaps, the

whole nation. This will enable properly triaged trauma management.

Images of few cases from the Study

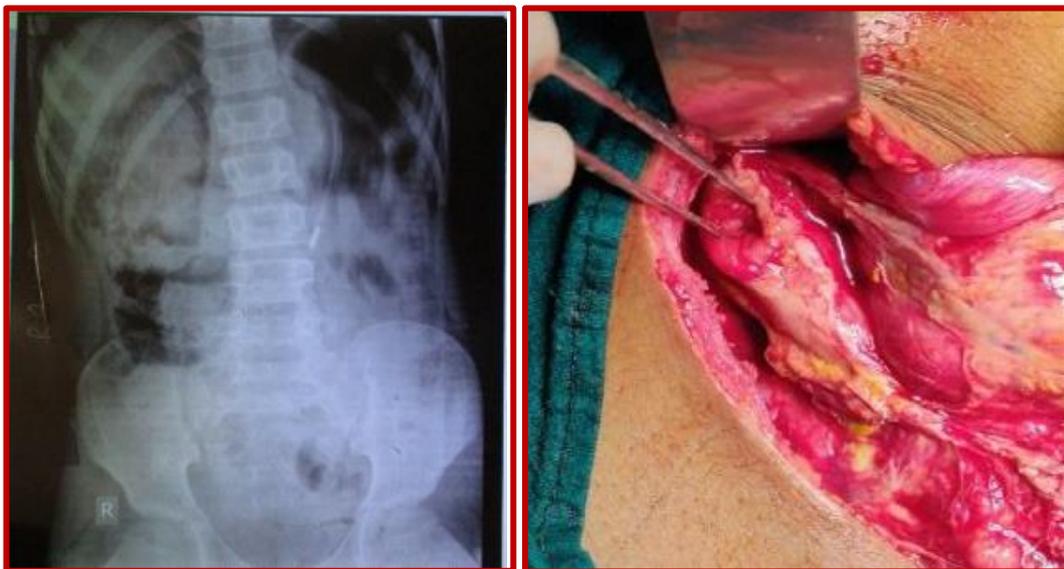


Figure 10: Duodenal Perforation due to RTA in a 10-year-old male child



Figure 11: Bladder Rupture due to RTA in a 5-year-old female child

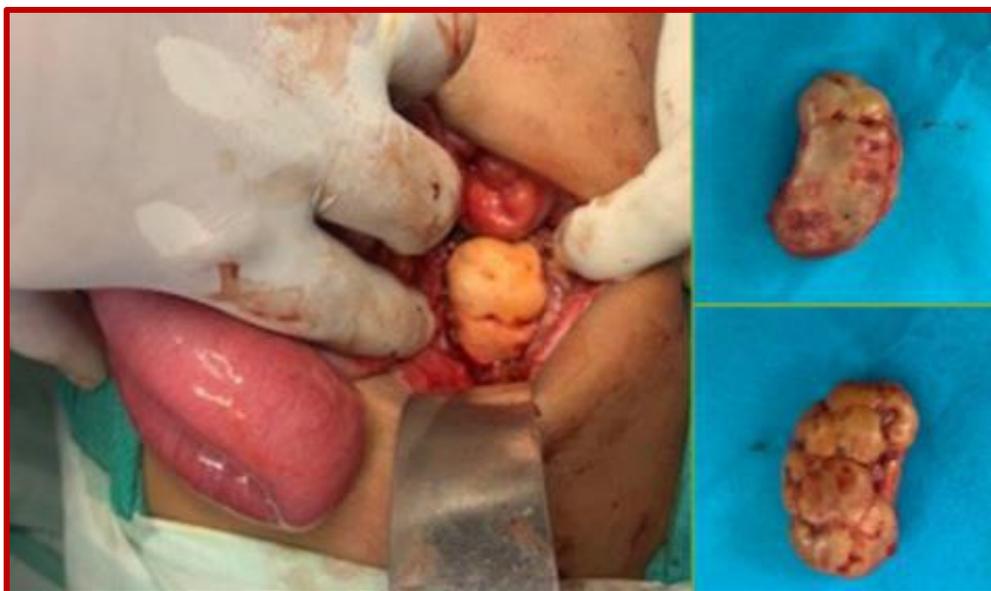


Figure 12: Renal Injury due to RTA in a 10-year-old female child

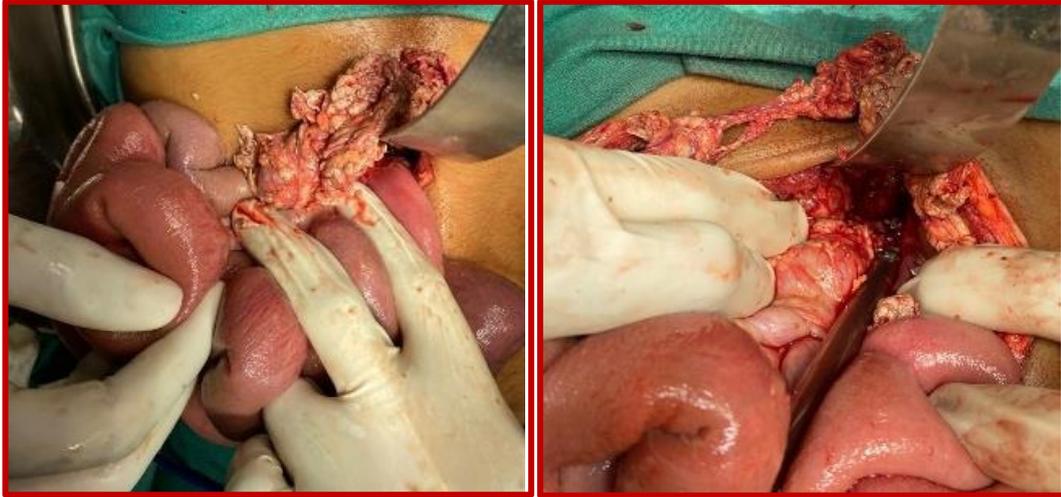


Figure 13: Pancreatic Injury due to RTA in a 6-year-old female child



Figure 14: Evisceration of Bowel due to Fall from Height in a 1^{1/2}-year-old Male child

Ethical Consideration

Approval was obtained from the Ethics Committee of osmania medical college, Hyderabad, Telangana, India. (ECR/300/Inst/AP/2013/RR-20)

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Conflict of interests

There is no conflict of interest

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