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A Clinical Study On Hollow Viscus Injuries In Abdominal Trauma.

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ABSTRACT

Abdominal injuries are the third most common injuries caused by trauma which includes both blunt and penetrating injuries affecting solid or hollow visceral organs or vascular structures with various modes of presentations ranging from deceptively normal appearance to moribund and collapsed state. This study focuses on hollow viscus injuries encountered in both blunt and penetrating abdominal trauma. To study the incidence of hollow viscus injuries in both blunt and penetrating abdominal trauma and its relation with different variables. This study included 50 patients admitted in the casualty ward with abdominal trauma either blunt or penetrating with clinical, radiological, or intraoperative findings showing hollow viscus injuries at Government Royapettah Hospital, Kilpauk Medical College & Hospital, Chennai, Tamil Nadu, India in the year August 2022 to December 2022. Ultrasound abdomen and CT abdomen were not routinely done in all patients. Those patients in whom x-ray or clinical examination was not conclusive were subjected to USG and CT scans. After clinical assessment and basic investigations, patients were actively resuscitated with IV fluids, blood, and blood products especially those with hypotension and shock. Nasogastric tube aspiration was done for all patients to provide gastric decompression and bowel rest. Catheterization of the bladder was done so that urine output could be monitored especially in patients presented with shock. Also could monitor for hematuria or urinary retention in suspected cases of genitourinary trauma. Broad-spectrum antibiotics were given to combat septicemia due to enteric contents in cases of hollow viscus perforation and multiorgan failure. Most of the patients affected were in the age group of 21 – 30 years. Out of the 50 patients studied, 72% account for abdominal trauma due to blunt injury, and 28% account for penetrating trauma. Males (88%) were affected more than females. In blunt trauma, 61% of cases were due to road traffic accidents, and the remaining were assaults and falls. Among the penetrating injuries, all were stab injuries. Symptoms with which patients presented include abdominal pain, abdominal distension, and hypotension. Intraoperatively ileum (42.8%) was found to be the most common organ injured in penetrating injuries and the jejunum (44.4%) in blunt injuries with small bowel accounting for the majority of the cases. Only 2 patients died postoperatively and for the rest of the patients postoperative period was uneventful. Abdominal trauma forms an important part of surgical management. Mostly penetrating injuries present with obvious clinical findings while the presentation in blunt injury might be normal at times. Thorough clinical examination is very essential in all cases along with relevant imaging techniques and rapid intervention.

Keywords: Abdominal trauma, hollow viscus injuries, clinical examination, appropriate surgical interventions

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INTRODUCTION

In today's well-sophisticated civilian life, trauma is said to be the leading cause of morbidity and mortality in the mobile society [1]. Abdominal organ injuries are the third most common injuries encountered after head and chest injuries [2]. Blunt as well as penetrating injuries are not rare in hospital emergency departments. In trauma, the most commonly affected organs are solid viscera and many analytical studies have been done on these. But, hollow viscus injuries are not less common and are equally or more life threatening than solid visceral injuries accounting for more blood loss and contaminating bowel injuries [3]. Hollow viscus injuries in abdominal trauma refer to injuries pertaining from the cervical part of the esophagus to the anus, liver and biliary tract, and lower genitourinary tract [4]. The pattern of injuries can range from a serosal tear to a complete transection of the bowel or tracts [5]. Despite the latest techniques and newer technologies like Ultrasound scans, CT scans, MRI scans, and Endoscopy; the nature of the injury, clear clinical history, thorough clinical examination, and simple radiographs can help in diagnosing many patients with hollow visceral injuries with reasonable accuracy [6]. Any delay in diagnosis will eventually increase morbidity and mortality. So a general surgeon should be able to clinically suspect and tackle trauma, especially related to abdominal hollow visceral injuries which are so rampant these days. [7] Efforts have been made in this study to know about the incidence of abdominal trauma, different intra-abdominal organs injured in penetrating and blunt abdominal injuries, and their various outcomes.

METHODOLOGY

This study included 50 patients admitted in the casualty ward with abdominal trauma either blunt or penetrating with clinical, radiological, or intraoperative findings showing hollow viscus injuries at Government Royapettah Hospital, Kilpauk Medical College & Hospital, Chennai, Tamil Nadu, India in August 2022 to December 2022. Ultrasound abdomen and CT abdomen were not routinely done in all patients. Those patients in whom x-ray or clinical examination was not conclusive were subjected to USG and CT scans. After clinical assessment and basic investigations, patients were actively resuscitated with IV fluids, blood, and blood products especially those with hypotension and shock. Nasogastric tube aspiration was done for all patients to provide gastric decompression and bowel rest. Catheterization of the bladder was done so that urine output could be monitored especially in patients presented with shock. Also could monitor for hematuria or urinary retention in suspected cases of genitourinary trauma. Broad-spectrum antibiotics were given to combat septicemia due to enteric contents in cases of hollow viscus perforation and multiorgan failure after stabilizing the patient, other necessary investigations like basic radiological investigations and special radiological investigations were completed as and when needed, and patients were taken up for laparotomy. Since all patients had hollow viscus injuries, they invariably went in for surgical intervention. In almost all cases liberal vertical abdominal incisions were made and the abdominal viscera both solid and hollow viscus were inspected carefully for pathology. The anterior and posterior surfaces of the stomach, duodenum, small intestines, and colon were carefully examined. A smaller sac was opened and inspected retroperitoneum in suspected cases. Both intraperitoneal and extraperitoneal ruptures of the bladder were ruled out. Intraoperatively findings were noted including the organ injured and the type of injury; whether a contusion, mesenteric tear, perforation single or multiple. How each case was operated was also taken into account. Most of the cases had primary closure of the perforation. Other management options were resection anastomosis and omental patch closure. Post-operatively patients were managed with nasogastric aspiration, fluids, and antibiotics. Daily patients were monitored and assessed for recovery and complications which were treated appropriately. Patients were discharged after full recovery and were followed up depending on the type of surgery performed.

RESULTS

The following findings were observed in the observational study regarding hollow viscus injuries in abdominal trauma involving 50 patients admitted with trauma abdomen in the casualty. Parameters included in the study were age distribution, sex distribution, mode of injury blunt or penetrating, organs injured in both types, radiological findings, treatment or intervention modalities.

Table 1: Age Distribution

Age (years)	No of patients
<20	1
21-30	27
31-40	13
41-50	9

Out of the 50 patients studied only 1 patient was under the age of 20 years. 27 patients fall in the age group of 21-30 years which shows the increased incidence of RTAs and assaults and thereby increased abdominal trauma in this group. 13 patients were in the age group of 31- 40 years whereas when it comes to 41-50 years there were only 9 patients, which shows the decreased incidence of inciting factor as age advances. 44 patients out of 50 patients were males and 6 were females indicating increased injuries in males because of increased incidence of RTAs and assaults in them.

Table 2 Mode Of Injury

Blunt injury	Penetrating injury
36	14

Out of 50 patients more than half of the patients with hollow viscus injuries were having injury due to blunt trauma accounting for about 72% and the rest had penetrating hollow viscus injuries.

Table 3: Type Of Blunt Trauma

Type of blunt trauma	No of patients
RTA	22
Assault [knife, sharp objects]	6
Fall [free fall, fall from moving vehicle, fall following hit]	8

The most common cause of blunt abdominal trauma was found to be RTA. Out of 36 patients 22 patients had blunt hollow viscus injuries due to RTA and the rest 14 were due to falls and 8 due to assaults.

Table 4: Organs Injured In Blunt Injury

Organs injured	No of patients
Jejunum [proximal, distal]	16
Ileum	13
Gall bladder [fundus]	4
Urinary bladder	2
Colon [transverse]	1

The study concluded that in patients with blunt abdominal trauma most common organ injured was the jejunum followed by the ileum. Out of 36 blunt trauma cases, 16 were jejunal injuries, and 13 were ileal injuries. There were 4 cases of gall bladder perforation and 2 cases of urinary bladder rupture. 1 patient had a perforation in the transverse colon.

Table 5: Organs Injured In Penetrating Trauma

Organ injured	No of patients
Ileum	6
Jejunum	4
Stomach	3
Colon [transverse]	1

In traumatic penetrating abdominal injuries ileum was found to be the most common organ injured followed by jejunum. Out of the 14 patients with penetrating abdominal trauma 6 had injuries identified in the ileum and 4 in the jejunum. 3 patients had injuries in the stomach and 1 patient with colonic injury.

Table 6: Bowel Injury And Abdominal Trauma

Bowel injury	No of patients
Jejunum	20
Ileum	19
Colon	2

Shows the number of patients with traumatic bowel injury of small and large intestines which says that out of 50 patients, 41 had intestinal injuries with small intestines accounting for 39 cases. Only 2 patients had injuries in large bowel. The most common symptom with which the patients presented was abdominal pain. Out of 50 patients 44 presented with abdominal pain. 27 patients had evidence of peritoneal irritation like guarding or rigidity. Only 12 patients had any external findings. At the time of admission 16 patients presented with hypovolemia and shock.

Table 7: Radiological Findings Based On X-Ray Abdomen Erect

X-ray of abdomen erect	No of patients
Air under diaphragm	31
Dilated bowel loops	3
Ground glass appearance	4
No abnormalities detected	8
Not taken	4

The commonest finding in erect X-rays was air under the diaphragm with 31 patients having it. 8 patients did not have any specific findings. X-ray was not taken for 4 patients as they were hemodynamically unstable to shift.

Table 8: Modes Of Management

Mode of management	No of patients
Primary closure of perforation	22
Omental patch closure of perforation	7
Resection and anastomosis	10
Repair of serosal tear	5
Open cholecystectomy	4
Urinary bladder repair	2

Table 9: Gastro Intestinal Injury And Management

	Primary closure of perforation	Omental patch closure of perforation	Repair of serosal tear	Resection and anastomosis
Jejunum	13	4	2	1
Ileum	7		3	9
Stomach		3		
Colon	2			

The commonest repair methods performed for gastrointestinal injuries include primary closure of perforation, omental patch closure of perforation, serosal tear repair and resection, and anastomosis. Out of the 44 cases with this kind of injury 20 cases underwent primary closure of perforation. 10 cases had resection and anastomosis. 5 cases with serosal tears underwent simple repair.

DISCUSSION

In this prospective study of hollow viscus injuries due to abdominal trauma, observations were made based on 50 patients admitted with hollow viscus injuries following road traffic accidents, falls from height assault by objects, and interpersonal violence [8]. Only 1 patient was under the age of 19 years with 27 patients falling in the age group of 21 to 30 years amounting to 54%. Males account for 44 cases (88%) and females for 6 cases (12%). The majority of males account for the preponderance involved in road traffic accidents and interpersonal violence. Both blunt and penetrating trauma were separately studied [9]. The commonest type of injury leading to hollow viscus injuries was noted to be blunt injury probably because of the force it uses to cause. 72% of the patients had blunt trauma and 28% had penetrating trauma following which they developed hollow viscus injuries. [10] Different modes of blunt injury included RTA, assaults, and falls out of which RTA acquired the first position accounting for 61% (22). 8 patients had blunt injury following falls and 6 had it following assault by objects and interpersonal violence [11]. Causes for penetrating injuries include stab injuries and gunshot injuries which gunshot injuries are not common in our part of the world. 14 patients had hollow viscus injuries due to abdominal stabs. Patients with traumatic abdominal injuries presented with abdominal pain, abdominal tenderness, guarding, external injuries on the abdominal wall, hypovolemia, and shock [12]. The commonest symptom to note was abdominal pain. It was present in 44 patients. 16 patients presented with hypovolemia and shock. 32 patients had tenderness over the abdomen and among that, only 27 patients had guarding and rigidity. 12 patients had external injuries over the abdominal wall like bruises or contusions [13]. Organs injured in both blunt and penetrating were separately noted. In both types, small bowel accounted for the most number of cases. Not a single case of duodenal injury was noted probably because of the retroperitoneal location of the duodenum. Most cases had the jejunal or ileal injury [14]. Out of the 36 patients with blunt abdominal trauma 16 had jejunal injuries and 13 had ileal injuries. The colonic injury was found in 1 patient. Traumatic gall bladder perforation was noted in 4 patients which is rare. 2 patients had a perforation in the urinary bladder which was extraperitoneal. In patients with hollow viscus injuries following penetrating trauma 10 patients had small intestinal injuries which constituted 6 ileal injuries and 4 jejunal injuries. 3 patients had gastric injuries and 1 had colonic injury. In short, taking together both blunt and penetrating trauma 20 patients had jejunal injuries (40%) and 19 patients had ileal injuries (38%). 2 patients had colonic injuries [15]. Out of the 50 patients, 41 had bowel injuries including small and large intestines which accounts for 82%. One of the most reliable and cost-effective investigations available in almost all institutes is plain abdominal radiographs which can detect hollow viscus injuries as free air under diaphragm or ground glass appearance. However not all patients with hollow viscus injuries present with pneumoperitoneum [16]. In this study 31 patients presented with free air under the diaphragm in radiographs (62%). Ground glass appearance was noted in 4 patients (8%) which mostly points on to gross hemoperitoneum. 8 patients were found to have no specific abnormalities owing to findings like serosal tear or gall bladder perforation. In 4 patients x ray was not taken since they were hemodynamically unstable to shift for any investigation. Since all the cases were hollow viscus injuries none of the patients were managed conservatively. Some sort of operative intervention was implemented in 50 patients [17]. Even though surgical intervention stood as definitive management; the first and foremost management in these patients were resuscitation with iv fluids and blood and blood products. Modes of management included repair of serosal tear, primary closure of perforation, omental patch closure of perforation, resection and anastomosis for gastrointestinal injuries, cholecystectomy for gall bladder perforation and closure in 2 layers for urinary bladder injuries [18]. The commonest modality performed was primary closure of perforation. 22 patients (44%) underwent this procedure which includes 13 jejunal injuries, 7 ileal injuries and 2 colonic injuries. 7 patients (14%) had omental patch closure in which 4 were jejunal injuries and 3 were gastric injuries. 2 patients with serosal tear in jejunum and 3 with tear in ileum were managed with simple repair of the tear. 20% of the patients had resection and anastomosis [19]. Out of the 10 patients who underwent resection and anastomosis had ileal injury and only 1 patient had jejunal injury substantiating resection and anastomosis to be the most common modality of management in ileal injuries. In short most of the jejunal injuries had primary closure and ileal injuries had resection and anastomosis. Postoperative period was uneventful in almost all patients and 2 patients died in the postoperative period. 1 patient had blunt injury following fall from height and sustained ileal injury for which he underwent resection and anastomosis and died on the operated day. Another patient was admitted with blunt injury following assault and had resection and anastomosis for ileal perforation and died on third postoperative due to myocardial infarction [20].

CONCLUSION

Hollow viscus injury refers to injury to stomach, small intestine, colon, or rectum, gall bladder and urinary bladder following traumatic mechanisms, which can be blunt or penetrating. These injuries are less common than injuries to solid viscera and mostly occurs following blunt trauma. The severity and type of injury depends upon the mechanism of trauma and can range from minor contusion to complete devascularization. Based on the mechanism of injury patient should be assessed thoroughly to look for any gastrointestinal injury which includes clinical examination, radiological investigation and other relevant findings. The signs like abdominal tenderness, abdominal distension or signs of peritoneal irritation may suggest an intra-abdominal injury, but are not specific. In addition to physical examination, abdominal radiographs form one of the valuable investigations to identify hollow viscus injuries. CT scan is useful in hemodynamically stable patients and is the first line noninvasive radiological investigation in identifying hollow viscus injuries and hemoperitoneum. Pneumoperitoneum, extra luminal enteric contrast, discontinuity of the wall of a hollow viscus organ, intraabdominal free fluid, bowel wall thickening, evidence of bowel infarction and mesenteric hematoma suggest injury to hollow viscus organ in CT scan.

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