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Clinical Study and Management of Hollow Viscus Injuries in Abdominal Trauma in KIMS, Hubli

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Abstract **Original Research Article**

Background and Objectives: Abdominal trauma has always posed a diagnostic and therapeutic dilemmato the treating surgeon. The present study is conducted to highlight type of abdominal trauma, the important clinical manifestations, to identify prone people, to identify investigation modalities for early and accurate diagnosis, to select the best management options, to choose proper treatment to minimize and prevent postoperative complications. ***Methods:*** 26 cases having history of abdominal trauma, both blunt and penetrating, and subsequently diagnosed to have hollow viscus injuries were studied with regard to clinical manifestations, type of injury, mode of injury, delay in presentation to the hospital, symptoms and signs on presentation, best diagnostic modalities, management options, postoperative complications, outcome. Patients associated with head, chest, spine and pelvic injuries were excluded. ***Results:*** Patients in the age group of 29-38 years were mostly affected (42.31%). Males were predominantly involved (96.15%). Majority were due to road traffic accidents (38.46%) and most commonly due to blunt abdominal trauma (53.85%). Majority were admitted within 1-10 hours (53.85%) and operated within 10 hours of trauma (30.76%). Pain abdomen was the most common symptom seen in 92.31% cases. 19.23% of patients were in shock at time of presentation. 50% had all peritoneal signs. 61.54% of patients had evidence of pneumoperitoneum on X-ray. Small bowel was most commonly injured organ of which, jejunal perforation was most common (34.6%) followed by ileum in blunt trauma and multiple hollow viscus injuries in penetrating injury. Primary repair was most commonly performed operative procedure in 53.86% cases. Most commonly associated injuries were orthopaedic injuries (28.58%). Mean hospital stay was for 10.62 days. Majority, 50% of patients had no postoperative complications. Overall mortality rate was 26.92% (n=7 cases). ***Conclusion:*** Hollow viscus injury due to abdominal trauma is difficult to diagnose. Early diagnosis both clinically and radiologically and treatment are of utmost importance in the management of these cases. Blunt trauma was responsible for most cases. Small intestine is more frequently injured than colon, commonest injury is a perforation in the antimesentric border of small intestine. Negative peritoneal tap does not exclude an intra-abdominal injury. Ultrasonography by Focussed abdominal sonography for trauma is a likely tool to evaluate suspicious patients. Associated injuries are common and it aids in diagnosis. Primary repair can be performed in almost all cases with isolated perforations and minimal fecal contamination. The delay between time of injury and initiation of treatment is responsible for unfavourable outcome.

Keywords: Blunt abdominal trauma, Penetrating abdominal trauma, Hollow Viscus Injury, Paracentesis, Pneumoperitoneum, Free Fluid, Primary repair, Resection and anastomosis, Eviscerated Gangrenous Small Bowel, Subcutaneous emphysema, Expiry, Colostomy, Ileostomy, Postoperative complications.

INTRODUCTION

Trauma is the study of medical problems associated with physical injury [1]. Trauma or injury has been defined as damage to the body caused by an exchange with environmental energy that is beyond the body's resilience [2]. Trauma is a major worldwide public health problem [3].

Trauma remains the most common cause of death for all individuals between the ages of 1 and 44 years and is the third most common cause of death regardless of age [3]. Globally, injury is the seventh leading cause of death with 5.8 million deaths in 2006 [3].

Although abdominal trauma has been noted since the earliest of medical records, the predominant circumstances of modern injury have altered to high energy transfer impacts which deliver a large amount of energy to the tissues.eg missile trauma from gunshots and bomb blasts rather than hunting incidents and kicks from a horse's hoof [4].

Trauma deaths occur at traditionally recognised time points after injury. Approximately half of trauma deaths occur within seconds or minutes after injury [3].

The second mortality peak occurs within hours of injury and accounts for approximately 30% of deaths. Most of these deaths can be averted by treatment during so called "golden hour" [3]. Trauma system and acute patient care has the greatest impact on this group of injured patients. Recent analysis of trauma system efficacy suggests at least a 10% reduction in preventable deaths as a result of trauma systems [3].

The abdomen is the third most common anatomical area of the body which undergoes blunt and penetrating injuries, and 75% of these injuries are due to road-traffic accidents [5]. The intestine the 3rd most commonly injured abdominal organ in blunt trauma [6]. The abdomen is a diagnostic black box. Fortunately, with few exceptions it is not necessary to determine which intra-abdominal organs are injured, only whether an exploratory laparotomy is necessary. Physical examination of the abdomen is unreliable in making this determination [2].

Early recognition of hollow viscus injuries from blunt abdominal trauma is difficult. An overlooked bowel injury is very dangerous because of its tremendous infectious potential [6].

The axiom that when in doubt it is better to "look and see", rather than "wait and see", might have encouraged earlier operation [7].

This study was undertaken to study the varied presentations and outcome of traumatic hollow viscus injuries in Karnataka Institute of Medical Sciences, Hubli with available trauma care facilities.

AIMS AND OBJECTIVES

- To study common cause of hollow viscus injury, whether it is due blunt or penetrating abdominal trauma in KIMS Hospital.
- To study different modes of presentation of hollow viscus injury in both blunt and penetrating abdominal injury.
- To study age and sex distribution.
- To study interval between trauma and admission and surgery and its effect on final outcome.
- To study the diagnostic modalities and management of hollow viscus injuries. To analyse the surgical procedure and postoperative outcome.
- To analyse the anatomic sites involved in traumatic hollow viscus injuries.

MATERIAL & METHODS

Source of Data

The clinical study was carried out on patients with hollow viscus injury in abdominal trauma admitted and treated in surgical ward in KIMS- Hubli.

Inclusion Criteria

- Age group 13-80 years.
- All cases of hollow viscus injury following blunt and penetrating abdominal injury admitted in KIMS Hospital during the study period from January 2012 to June 2013.

Exclusion Criteria

- Injuries associated with
- Thoracic injuries, rib fractures
- Injuries to spine.
- Pelvic fractures.
- Head trauma.

METHODS OF COLLECTION OF DATA

The patients were selected as per inclusion and exclusion criteria. An informed consent was taken. Careful history was taken from selected patients, their attenders who then underwent general and systemic examination. Patients were evaluated in the self designed examination proforma. The relevant investigations were done to achieve the correct diagnosis. The patients were operated on emergency basis. The operative findings were noted. Post operatively monitored and resuscitated in Surgical ICU (SICU). The follow up of patients was done after one week of discharge.

Sample Size

During the study period there were totally 31 patients with hollow viscus injury which included both blunt and penetrating injury admitted and operated. After considering both inclusion and exclusion criteria during the study period, total number of patients who could be included in study was 26.

RESULTS

- The study was conducted in KIMS, Hubli from January 2012 to June 2013.
- Total number of patients studied was 26.

Type of Injury

In the present study on 26 patients, 15 cases (57.69%) of blunt trauma were responsible for hollow viscus injury compared to 11 cases (42.31%) of penetrating trauma.

Age Distribution

- In the present study, maximum of 11 cases were admitted in 29-38 years age group (42.31%) followed by 6 cases in 19-28 years of age (23.08%).
- Range was from 19 to 75 years.

Sex Distribution

In the present study, 25 (96.15%) patients were males and 1 (3.85%) were females.

Mode of Injury

Mode of injury	No of patients	% of patients
Road traffic accident	10	38.46
Assault	6	23.08
Bull Gore Injury	4	15.38
Fall	4	15.38
Gun Shot	1	3.85
Not Known	1	3.85
Total	26	100.00

In the present study, hollow viscus injury due to road traffic accidents in 10 cases (38.46%) was the most common cause of abdominal trauma followed by assault in 6 cases (23.08%).

Mode of Injury in Blunt Trauma

In this study, blunt trauma was most commonly due to road traffic accident 60%, followed by fall in 20% thus reflecting increased utilization of vehicles and automobiles in this modern era of transportation.

Mode of Injury in Penetrating Trauma

In 11 penetrating injury cases, 6 cases (54.55%) were due to assault (stab wound), 2 cases of bull gore (18.18%), 1 case (9.09%) each of fall and road traffic accident .One gun shot injury case was reported.

Study on Interval between Trauma and Surgery

Interval between trauma and surgery (hrs)	No of patients	% of patients
<10	8	30.76
11-20	6	23.08
21-30	5	19.23
31+	6	23.08
Not known	1	3.85
Total	26	100.00
Mean (hours)	56.52	
SD (hours)	+/- 96.42	

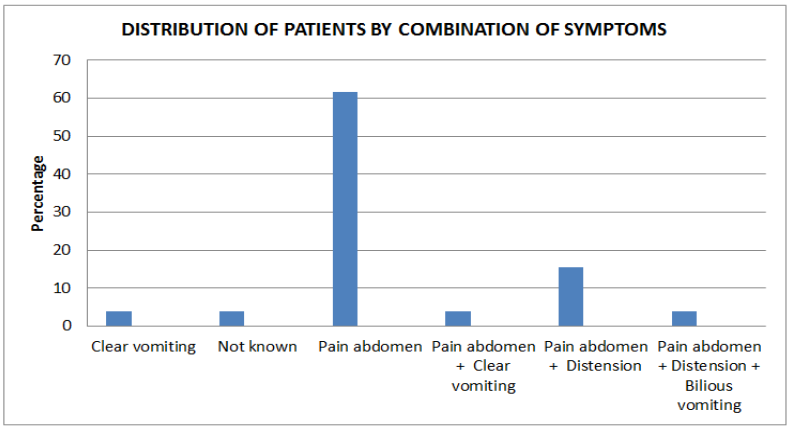
In the present study, all cases were managed surgically. The time interval between admission and surgery varied from 3-339 hours with a mean interval of 56.52 hours. Of the 26 patients studied, interval was not known for one case, 8 cases (30.76%) were operated within 10 hours of admission. 6 (23.08%) cases were operated within 11-20 hours after admission and equal number were operated more than 31hours. Remaining cases 5 (19.23%) were operated between 21 to 30 hours.

The study showed higher values of Mean (56.52 hrs) and Standard Deviation (+/- 96.42 hrs) as four cases presented to emergency department over an interval more than 100 hrs and one case had delayed presentation (138hrs) of perforative peritonitis due to blunt abdominal trauma, which lead to increase in interval between trauma and surgery, thus affecting the observations. After exclusion of those five cases, and one case for whom interval was not elicited the calculated, mean and standard deviation are

MEAN (hours)	14.95
SD (hours)	=/- 11.25

Study of Patients by Combination of Symptoms

Symptoms	No of patients	% of patients
Clear vomiting	1	3.85
Not known	1	3.85
Pain abdomen	16	61.54
Pain abdomen + Clear vomiting	1	3.85
Pain abdomen + Distension	4	15.38
Pain abdomen + Distension + Bilious vomiting + Constipation	1	3.85
Pain abdomen + Distension + Clear vomiting + Constipation	1	3.85
Pain abdomen + Hematemesis	1	3.85
Total	26	100.00



In the study on combination of symptoms, majority of patients i.e. 61.54%, presented with pain abdomen followed by combination of pain in abdomen with distension in 15.38% following abdominal trauma. Only one case presented with clear vomiting and for one case the history was not elicited as he was drowsy.

Distribution of Patients According To Individual Symptoms

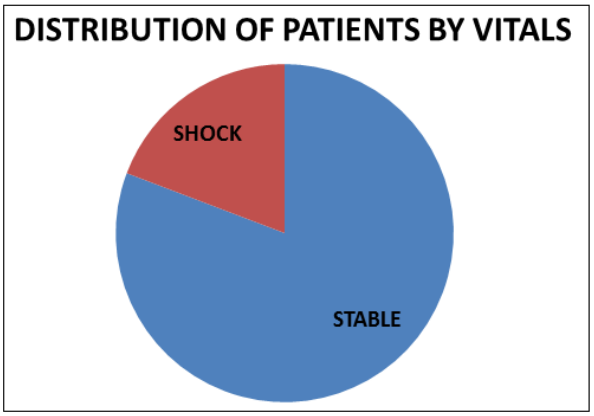
Symptoms	No of patients	% of patients
Not known	1	3.85
Pain abdomen	24	92.31
Distension	6	23.08
Hematemesis	1	3.85
Clear vomiting	3	11.54
Bilious vomiting	1	3.85
Constipation	2	7.69

Most common presenting symptom was pain abdomen in 92.31% cases (n=24) followed by abdominal distension in 23.08% cases. One case with penetrating trauma presented with only clear vomiting.

Study of Patients by Vitals Was

Vitals	No of patients	% of patients
Stable	21	80.77
Shock	5	19.23
Total	26	100.00

In my study, 21 cases (80.77%) were stable on admission. Only 5 cases presented in shock contributing to 19.23% cases.



In my study, 21 cases (80.77%) were stable on admission. Only 5 cases presented in shock contributing to 19.23% cases.

Study of Patients by Abdominal Signs

Abdominal Signs	No of Patients	% of patients
Tenderness	6	23.08
Tenderness + Guarding	7	26.92
Tenderness + Guarding + Rigidity	13	50.00
Total	26	100.00

50% patients had all the three peritoneal signs followed by 26.92% who presented with tenderness and guarding. This emphasizes the importance of careful examination of patients with abdominal trauma.

Study of Patients by Individual Signs

Abdominal signs	Number of patients	% of patients
Tenderness	26	100
Guarding	20	76.92
Rigidity	13	50

In my study, all cases had abdominal tenderness (100%), followed by guarding in 76.92% and rigidity in 50%.

Study of Air under Diaphragm on Chest X Ray

Chest X-ray	No of patients	% of patients
Absent	10	38.46
Present	16	61.54
Total	26	100.00

In this study, 61.54% (n=16) presented with air under diaphragm radiologically.

Study on Paracentesis Was

Paracentesis	No of patients	% of patients
Negative	15	57.69
Positive	11	42.31
Total	26	100.00

In my study, paracentesis was negative in 15 cases (57.69%).

Study of Ultrasonography Was

Ultrasonography findings (free fluid)	No of patients	% of patients
Not done	22	84.62
Present	2	7.69
Present + Bladder rupture	1	3.85
Present + Muscle tear	1	3.85
Total	26	100.00

In my study, ultrasonography was done in only 15.39% (n=4 cases). All the cases in which ultrasonography was done revealed presence of free fluid. Ultrasonography was not done in 22 cases (84.62%).

Distribution According To Specific Organ Injury Was

Specific organ injured	Number of patients	% Hollow viscus injured
Gastric	6	19.35
Small bowel	19	61.29
Colon	5	16.13
Urinary bladder	1	3.23
Total	31	100

In this study, the most common hollow viscus injured was small bowel in 61.29% (n=19) followed by stomach in 19.35% (n=6), colon in 16.13% (n=5). One case of intraperitoneal urinary bladder rupture was reported.

Distribution of Site of Injury in Individual Patient Was

Site of injury	No of patients	Percentage
Eviscerated Gangrenous Small Bowel	1	3.8
Extra-mucosal anterior gastric wall injury	1	3.8
Gastric perforation	1	11.5
Hepatic Flexure Colon Perforation	1	3.8
Ileal perforation	4	15.4
Intra-peritoneal Urinary Bladder Rupture	1	3.8
Jejunal Perforation	9	34.6
Multiple Perforations	5	19.2
Transverse Colon Perforation	1	3.8
Total	26	100.0

The most common isolated hollow viscus organ involved was jejunal in 34.6% (n=9). Multiple hollow viscus injuries were 2nd most common seen in 19.2% (n=5cases). Ileum was involved in 4 cases (15.4%) followed by 3 (11.5%) gastric perforations. Single case (3.85%) each of eviscerated gangrenous small bowel, extra mucosal anterior gastric wall injury, hepatic flexure colon perforation, intra-peritoneal urinary bladder rupture and transverse colon perforation were studied.

Study on Surgical Procedure Was

Surgical procedure on hollow viscus injury	Number of patients	% of patients
Primary repair	14	53.86
Primary repair with other procedures	4	15.38
Resection and anastomosis	5	19.23
Resection and anastomosis with other procedures	1	3.85
Temporary colostomy	2	7.69
TOTAL	26	100

In my study, primary repair was performed in 53.86% (n=14) cases followed by resection and anastomosis in 19.23%. In 4 cases primary repair was carried with other procedures, of which in 2 cases primary repair was combined with diaphragmatic repair and intercostal drain placement. In one case primary repair was performed with temporary colostomy, feeding colostomy, diaphragmatic repair and intercostal drain placement,

In one case of intra-peritoneal urinary bladder rupture, primary repair was performed with suprapubiccystotomy.

Resection and anastomosis was done in 19.23% (n=5 cases). Resection and anastomosis was carried out along with temporary sigmoid colostomy in one gunshot injury case who was readmitted after 45 days for colostomy closure and discharged uneventfully.

Temporary colostomy was performed in 7.69% (n=2 cases) both of which succumbed to death.

Study on Associated Injuries Was

In my study, the most common associated injury was orthopaedic 28.58% due to blunt abdominal trauma followed by equal number of cases with mesenteric tear and retroperitoneal hematoma 19.05% (n=4 cases). Diaphragmatic tear was noted in 14.27%.

Combined injuries were noted in 19.05% (blunt=3 and penetrating=1). 3 cases had retroperitoneal hematoma associated with mesenteric tear, diaphragmatic tear and orthopaedic injury respectively and one had combined orthopaedic and mesenteric injury. One had only retroperitoneal hematoma due to penetrating injury abdomen.

4 cases of mesenteric tear (blunt-3 and penetrating =1) were noted of which 2 were isolated mesenteric injuries. Of the remaining two. One was associated with orthopaedic injury and other had retroperitoneal hematoma. All three diaphragmatic tears were seen in penetrating injury.

Study on Duration of Hospital Stay

Maximal duration of hospital stay was 11-15 days in 9 cases (34.62%) followed by 6-10 days hospital stay accounting for 8 cases (30.77%). 5 cases (19.23%) stayed for more than 16 days and 4 patients (15.38%) had a duration of hospital stay for 1-5 days.

Study on Postoperative Complications

Postoperative complications	No of patients	% of patients
Anastomotic leak	1	3.8
Hypotension	4	15.4
Hypotension with other complications	4	15.4
NIL	13	50.0
Pneumonia	1	3.8
Serum electrolyte disturbance	1	3.8
Wound infection	2	7.7
Total	26	100.00

In this study there were no postoperative complications in 13 cases (50%) followed by 4 cases (15.4%) of hypotension, and 4 cases (15.4%) hypotension with other complications. 2 cases (7.7%) were reported wound infection and a single case (3.85%) each of anastomotic leak, pneumonia and serum electrolyte imbalance were studied.

Study of Individual Postoperative Complications

17 complications occurring in 13 patients (50%) were identified. The most common postoperative complication was hypotension in 47.06%, followed by 11.76% cases of wound infection and serum electrolyte imbalance.

Study on Outcome of Patients Was

Outcome	No of patients	% of patients
Discharge	16	61.5
Expired	7	26.92
NA	3	11.5
Total	26	100.00

Of the 26 cases 16(61.5%) were discharged and 7(26.92) expired. 3 patients (7.69%) refused further treatment.

Study On Follow Up Of Patients

Sincere efforts were made to follow up all cases discharged successfully after one week of date of discharge and found 16 (61.5%) were stable. 10 (38.5%) patients were lost for follow up as either they expired during their course of stay in hospital or who refused treatment in the hospital.

CONCLUSION

To conclude,

- Early presentation to the hospital, early diagnosis and treatment are of utmost importance in the management of these cases.
- Blunt trauma was responsible for most cases of hollow viscus injury.
- Small intestine is more frequently injured than colon, commonest injury is a perforation in the antimesentric border of the small intestine.
- Jejunum is the most common site of perforation.
- Negative peritoneal tap does not exclude an intra-abdominal injury.
- Emergency radiological examination is an important tool to evaluate suspicious patients.
- Ultrasonography by Focussed abdominal sonography for trauma is a likely tool to evaluate suspicious patients. Associated injuries are common and its aids in diagnosis.
- Primary repair can be performed in almost all cases with isolated perforations and minimal fecal contamination.
- The delay between time of injury and initiation of treatment is responsible for unfavourable outcome.

SUMMARY

In the present study,

1) 26 cases of abdominal trauma with hollow viscus injury were encountered.
2) 42.31% of patients were in the age group of 29-38 years. Mean age was 36.85 years.
3) 96.15% were male. Male:Female ratio is 24.97:1.
4) 38.46% were due to road traffic accidents.
5) 57.6% accounted for blunt abdominal trauma.
6) 53.85% were admitted within 1-10 hrs of trauma.
7) 30.76% patients were operated within 10 hrs of trauma.
8) Pain abdomen was the most common symptom.
9) 19.23% of patients were in shock.
10) 50% had abdominal signs tenderness, guarding and rigidity.

11) Presence or absence of bowel sounds was not found to be diagnostic value in this study.
12) 61.54% of patients had evidence of pneumoperitoneum on X ray.
13) Paracentesis was not a reliable investigation for hollow viscus injury.
14) USG had limited use in this study, but was found sensitive in detecting free fluid in all four cases in which performed.
15) Jejunal perforation was most common (34.6%) followed by ileum (15.4%).
16) Primary repair was most commonly performed operative procedure, 53.86%.
17) Median hospital stay was for 10.62 days.
18) Most common postoperative complication encountered was hypotension in 47.06% (8 cases). Majority, 50% of patients had no postoperative complications.
19) Overall mortality rate was 26.92%.
20) 25.58% cases had associated orthopaedic injuries.
21) All patients discharged were followed up after one week with no morbidity.

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