



The study of incidence of hollow viscous injury in penetrating abdominal injuries

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ABSTRACT

Aim

1. The study was aimed at the incident of injury to the stomach, small bowel large bowel, in different types of penetrating abdominal injuries.
2. This study also aimed at studying the Mode of injury, Clinical presentation, Management and Prognosis

Methods and Material

This study consists of all penetrating abdominal injuries admitted in the trauma ward of government Rajiv Gandhi Government general hospital from October 2015 to October 2016. Once the patient is admitted the name, age, sex and mode of injury are noted. The time interval between injury and admission and time interval between admission and surgery are recorded.

Conclusion

The incidence of hollow viscous injury in penetrating abdominal injury in this study is about **58%**. Stab injury is the common mode of producing penetrating abdominal injuries. More than 60% of the patients belong to the age group between 21 - 40 years which is the most productive part of one's life. Liver, small bowel and stomach are the 3 most frequently injured organs. The overall mortality of penetrating abdominal injuries in this study was 12% and morbidity was 80%. Septicemia and Hypovolumic shock due to bleeding was the major causes of death.

KEYWORDS

Hollow viscus injury, abdominal trauma, Penetrating injury.

Aim

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Introduction

Trauma ranks along with cardiovascular and malignancy as a major cause of morbidity and mortality. Still trauma continues to be a leading cause of death in the first four decades of life. There are various predisposing factors of trauma like high speed vehicles, stab injuries, terrorism. Major trauma does not respect and restrict itself to one organ or one system. Evaluation of patient with abdominal trauma can be most challenging task that a surgeon to be called upon to deal with. Penetrating abdominal injuries may be parietal or visceral or perforating through and through injuries. Visceral injuries may be intraperitoneal or retroperitoneal. Stomach, duodenum, small bowel, large bowel are the organs included in the study. Multiorgan injuries, exsanguinated hemorrhages, delayed presentations and the ominous reputation for high mortality and morbidity are just few of the many reasons which make this topic of penetrating injuries a fascinating one.

Management of Traumatic injuries is a challenge to the clinicians. Traumatic injuries remain the leading cause of death among 12-45 year age group. 1 Hollow viscus and mesenteric injury are found in 3-5% of patients treated for blunt abdominal trauma (BAT). 2-5 They represent 16% of all lesions seen in BAT and in third in order of frequency after liver and splenic injury. Hollow viscus injury (HVI) is difficult to diagnose and any delay in diagnosis will eventually increase the morbidity and mortality.

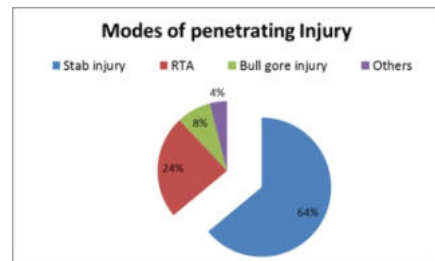
Methods and Methodology

This study consists of all penetrating abdominal injuries admitted in the trauma ward of government Rajiv Gandhi Government general hospital from October 2015 to October 2016. Once the patient is admitted the name, age, sex and mode of injury are noted. The time interval between injury and admission and time

interval between admission and surgery are recorded. After retesting the patient and if time permits necessary investigation carried out. In those who are operated, the operative findings and methods of management are recorded. Cases are followed up till their discharge from the hospital. If death occurs the cause of death is evaluated. In those patients who died before surgery the postmortem findings are noted.

Results

Figure 1



As given in Figure 1. Stab injury is the common penetrating trauma accounting 64%. Therewere 12 cases of bullogre injury. 4 cases of RTA, 2 cases due to falling on iron rods in a concrete centering work site (accidental fall).

Figure 2

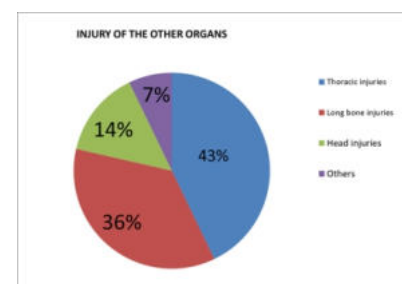


Figure 2 : Shows the associated injuries in penetrating abdominal injuries. 12 patients sustained associated thoracic injuries. 10 patients had long bone fractures. 4 patients suffered from head injuries. 1 patient sustained cut throat injury. 1 patient had pelvic bone fracture. Totally 28 patients (58%) had injuries involving other organs. This high incidence of polytrauma with penetrating injuries abdomen indicates the severity of injuries.

Table 1

Time internal	Injury – Admission	Admission - Surgery
<2 hrs	18	12
2-4 hrs	12	18
4-6 hrs	8	8
6-8 hrs	4	2
8-10 hrs	3	1
10-12 hrs	3	4
> 12 hrs	2	5

Table 1 : shows 38 cases took less than 6 hrs from time of injury to admission. The fastest to arrive was within 30 minutes from the injury.

The average time duration between admission and surgery was 4 hrs

Table 2

Liver	8
Spleen	4
Stomach	8
Duodenum	4
Jejunum & ileum	10
Caecum & ascending colon	1
Transverse colon	3
Descending colon & sigmoid colon	3
Pancreas	2
Diaphragm	3
Retro peritoneal injuries	4

Table 2 : shows the incidence of hollow viscous injury in 29 cases accounting about 58%. Different organs injured in the study, small bowel tops the list with 10 cases. This is followed by the stomach and liver injury – accounting to 8 cases each, there were 4 cases of spleen, duodenum, and Retroperitoneal hematomas, 3 cases of transverse colon and 3 cases of sigmoid colon, 3 cases of diaphragmatic injuries, 2 cases of pancreas and 1 case of caecum injury.

There were totally 6 deaths in this study of 50 cases, constituting a mortality rate of 12%. Morbidity in mild to severe forms occurred in all patients who survived.

Break up of cause of death is given in table 3

Table 3

Splenic injury	2
Shattered liver injury with retrohepatic venous injury	2
Pancreatic injury	1
Diaphragmatic injury	1

The severe degree of morbidity occurred in the form of residual abscess, duodenal fistula, pancreatic fistula, post-operative lung infections etc., the mild form of morbidity were due to surgical site infection.

Discussion

Liver Injuries

There were totally 8 cases of liver injury, in this 6 cases were due to stab injury and 2 cases were due to road traffic accident. In this study only 3 cases were isolated liver injuries and remaining were associated with other organ injuries. The different ways in which

the 8 cases of liver injuries were managed as follows, application of Gel foam and suture hepatorrhaphy was done in 5 cases. In 1 case there was no active bleeding hence no repair done. In 1 case shattered liver present so segmental hepatectomy done. In 1 case omental pack was kept in deep lobar laceration to control bleeding. Peritoneal lavage with normal saline and open drainage was kept in all cases.

In this study 2 out of 8 cases died giving mortality rate of 25%. Mortality in our case was due to the severe associated injuries and one died of septicemia at the end of the 4th post operative day. Two cases developed subphrenic abscess.

Splenic Injuries

There were totally 4 cases of splenic injury. Of these 4 cases 3 cases were due to stab injury and 1 case was due to road traffic accident. In this study only one case had isolated splenic injuries. 1 case was associated with diaphragmatic injuries and 1 case had associated pancreatic injury with retroperitoneal hematoma. 1 case was associated with stomach and small bowel injury.

In this study all the injured spleen have undergone splenectomy. Whereas the series from Ben Taub Hospital, Houston report 45-50% of injured spleen have undergone repair instead of splenectomy that too splenorrhaphy was accompanied in 51% of patients with penetrating mechanism of injury.

In this study two cases died in the immediate post-operative period due to hypovolemic shock and multiple organ failure. 2 patients had fever ranging from 990F to 1020F up to 4th post-operative day and 1 patient had consolidation of the left lower lobe. All of them are treated conservatively with antibiotics and antipyretics. Three patients had wound infection.

Stomach Injuries

There were totally 8 cases of stomach injuries. In this 6 cases were due to stab injuries, 2 case due to Road traffic accident.

In this study isolated stomach injury was present in 3 cases. All remaining cases were associated with other organ injuries, of which retroperitoneal haematoma was present in 3 cases, liver injury in 2 cases, splenic injury in 1 case, duodenal injury in 1 case, diaphragmatic and small bowel injury in 1 case. Pre operatively all cases were confirmed by the passage of bright red blood through Ryle's tube and the presence of free air in X-Ray abdomen. In this study in all stomach injuries, the entrance and exit sites of the penetrating wound were visualized. Then the stomach was closed in two layers utilizing an inner continuous suture with 2-0 vicryl (or) catgut in full thickness manner. This layer is then imbricated with sero muscular layer of interrupted Lambert sutures using 2-0 or 3-0 silk. In one patient after gastrorrhaphy AGJ and JJ was done and that patient died of septicaemia on 4th post operative day. One more patient died of multiorgan failure due to concomitant liver and small bowel injuries. One patient developed consolidation of left lower lobe with left subphrenic abscess and three patients had wound infection and all by them treated conservatively. In all cases peritoneal lavage done with normal saline and open drainage kept.

Duodenal injuries

There were totally 4 cases of duodenal injuries of which 3 cases due to stab injury and 1 case due to bull gore. According to six recent series the incidence of penetrating duodenal injury was 85% and blunt duodenal trauma was 15% (SCNA Vol70 No: 3 June 1990). All patients were taken up for exploratory laparotomy. All patients underwent duodenorrhaphy in 2 layers. 2 patients underwent gastrojejunostomy, in 2 patients a serosal jejunal patch was kept. One patient tube decompression of duodenum was done. John A Weigelt also states that 80% of patients with duodenal injuries require simple duodenorrhaphy.

In this study one case died 5th post-operative day due to septicaemia and concomitant liver and colonic injuries. But this may not reflect the real problem because the number of cases

studied was too small and the period of study was also short. Levison et al 1984²¹ in a recent series reports a mortality of 16.7% for blunt duodenal trauma and mortality of 7.5% for penetrating duodenal trauma. Incidence of duodenal fistula in our study was 15%.

Pancreatic Injuries

There were totally 2 cases of pancreatic injuries. Of which one case was due to stab injury and one case was due to road traffic accident. Gregory J. Jurkovich states that penetrating trauma accounts for two third and blunt trauma accounts for one third of pancreatic injuries. In our study 95% of the patients had associated organ injuries which are in accordance with the reports of Balasegaram.M. 1979, Graham. J.M. et al 1978, Smego .DR et al 1985, and Stone .HH et al 1981.

One patient was taken up for cystojejunostomy as he presented with pseudocyst of pancreas. In one patient who had multiple stab injury of the bowel with pancreatic injury, had surgery done outside and was referred to our center with enterocutaneous and pancreatic fistula.

In this study the mortality rate for pancreatic injury was 50%. The combined mortality from several large series of pancreatic trauma patients range from 10- 25% (SCNA Vol 70 No. 3 June 1990). 17 our morbidity rate was 70%. In this study the incidence of pancreatic fistula was 50% which healed with conservative management.

Jejunum and Ileum Injuries

There were totally 10 cases of small bowel injuries. Of which 7 cases were due to stab injury and 2 cases were due to road traffic accident and 1 case was due to accidental fall injury. Whereas the incidence of small intestinal injury following penetrating trauma exceeds 80% with gunshot wound and 30% with stab injuries that penetrate the peritoneum (SCNA Vol - 70 No. 3 June 90)^{17,23}

In this study only 3 cases had isolated small bowel injury. In the remaining 4 cases had associated mesenteric tears, one case was associated with colonic injuries and other two cases were associated with liver, spleen and stomach injuries separately.

After laparotomy, thorough search for wounds from the ligament of Treitz to the ileocaecal valve was done in all small bowel injuries. In this study, three cases of hematomas and serosal lacerations of small bowel were 'Turned In' using Lambert sutures placed in a transverse fashion. In 3 cases with questionable viability of bowel, we have done resection and anastomosis in 2 layer transversely using inner continuous 2/0 vicryl and outer lembert sutures with 2/0 silk. In all cases thorough peritoneal irrigation with saline done and open drainage was kept.

In this study one case died due to concomitant colonic injury, because the number of cases studied was too small this may not reflect the real problem. In our study two patients had wound infection and two had intrabdominal abscess, both of these were treated with conservative management.

Caecum and ascending colon injury

There was only one isolated case of caecal injury due to stab injury. There was laceration of caecum and mild hematoma in mesentery, which was sutured in 2 layers using 2-0 vicryl and 2-0 silk. Thorough laparotomy done and peritoneal irrigation with saline done and open drainage kept.

Post operative period was uneventful, and patient recovered well. On 6th day there was wound infection, which was treated conservatively.

Transverse colon injuries

There were totally 3 cases of transverse colon injuries. 2 cases were due to stab injury and 2 cases due to road traffic accidentinjury. 2 cases were small laceration of transverse colon and hematoma in mesocolon which was repaired by lembert sutured transversely

with 2-0 silk. One patient had transverse colon transaction and mesocolon rent, which was repaired after trimming the edges and confirming the viability, anastomosis done in 2 layers using 2-0 vicryl and 2-0 silk. Peritoneal lavage done with normal saline and open drainage kept.

In this study all three cases were recovered better and 1 patient had wound infection, which was treated with conservative management.

Descending and Sigmoid Colon Injuries

There were totally 3 cases of injury to the sigmoid colon. 2 cases due to stab injury and 1 case due to road traffic accidentinjury. The road traffic accidentinjury case had associate injury to the scrotum. 2 cases had perforation of the sigmoid colon with sigmoid mesocolon rent. Both the cases were treated with primary 2 layer closure with 2-0 silk. In 3rd case there was laceration of sigmoid and ascending colon, in this resection and anastomosis done in 2 layer using 2-0 vicryl and 2-0 silk. Proximal covering transverse colostomy done, thorough peritoneal lavage given with normal saline and flank drain kept.

In all 3 cases postoperative period was uneventful. One case had wound infection at 5th postoperative day, which was treated conservatively.

Diaphragmatic injuries

There were totally 3 cases of diaphragmatic injuries. Of which 2 cases were due to stab injury and one case was due to road traffic accidentinjury. All cases were associated with intrabdominal injuries of which, two cases were associated with splenic injuries and one case was associated with combined stomach and splenic injuries.

In this study, after laparotomy only in one case we had converted into thoracoabdominal incision and in remaining cases repair was done through abdominal approach only. The rent was closed with simple sutures with 1- prolene or with other non absorbable suture materials or with figure of eight sutures of the same material. In all cases ICD was done after closure. One patient died on 4th postoperative day due to septicemia.

Conclusion

The incidence of hollow viscous injury in penetrating abdominal injury in this study is about **58%**. Stab injury is the common mode of producing penetrating abdominal injuries. More than 60% of the patients belong to the age group between 21 - 40 years which is the most productive part of one's life. Liver, small bowel and stomach are the 3 most frequently injured organs. The overall mortality of penetrating abdominal injuries in this study was 12% and morbidity was 80%. Septicemia and Hypovolumic shock due to bleeding was the major causes of death.

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