

A clinico radiological study of penetrating trauma abdomen with special reference to fire arm injury abdomen

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Abstract

Introduction: Abdominal trauma (blunt or penetrating) constitute 5- 10% of total case of poly trauma admitted in a large hospital. Its mortality and morbidity is next to head injury .In urban countries penetrating wounds are one of the most common surgical emergency. The causes of wound may be due to knife, bullets, instruments and explosion fragments. **Materials and Methods:** The present study was done in all patients of "penetrating trauma abdomen" admitted to the Nehru hospital, B.R.D. Medical College, Gorakhpur from May 2009 to June 2010. This study includes only patients having peritoneal breach. Medico legal charting and necessary resuscitative measure done according to need for serious patients. Some necessary investigations were done in all patients these are routine blood and urine examination, blood sugar, serum urea, serum creatinine and serum electrolyte, plain x-ray chest PA view x-ray abdomen A Perfect position, peritoneal taping, USG abdomen if needed. **Results:** In our study most common visceral injury due to penetrating trauma abdomen was small bowel (69.3%), colon (09.9%), mesenteric tear (09.9%), stomach (06.6%), vascular injury (03.3%) and liver injury in (03.3%). The hospital stay from the time of admission to the discharge of the patients. Majority of patients (62.7 %) had total hospital stay of 07-13 days. The mortality of patients of penetrating trauma abdomen manage operatively. Mortality rate is 00.00%. **Conclusion:** The incidence of penetrating abdominal injury was 30 cases of total cases admitted in surgical ward. The maximum patients were as a victim of penetrating abdominal injury of in between 21 to 30 years of age in which males are affected more commonly (29). Male predominated to the females. Male and female ratio was 3:1. Gunshot injury counted for maximum number of case (14) {46.66%} and knife was observed to be used most commonly.

Key Words: Abdominal trauma, USG, Gunshot injury.

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Introduction

Trauma is a worldwide killer contributing up to 40% of deaths. Thirty thousand deaths occur due to firearm injuries in USA every year. It includes both penetrating and blunt [1].

According to statistics, the commonest organ injured in blunt trauma abdomen is liver. In penetrating abdominal trauma the most commonly injured organs are

- 1) Small gut
- 2) Colon
- 3) Liver
- 4) Stomach and kidney

Abdominal trauma (blunt or penetrating) constitute 5-10% of total case of poly trauma admitted in a large hospital. Its mortality and morbidity is next to head injury .In urban countries penetrating wounds are one of the most common surgical emergency. The causes of wound may be due to knife, bullets, instruments and explosion fragments [2].

Diagnosis of penetrating injury is clear but may be difficulty is in assessing the extent of intraperitoneal injury. There may be masking of other associated injuries over abdominal injury[3].

Slow bleeding from solid viscera after injury not producing initial sign and symptom but may be fatal later [4].

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Exploratory laparotomy in all cases is obviously unwise as 40-60% patients may not have any significant intra abdominal injury. Diagnostic peritoneal lavage is not found to be as accurate and sensitive as blunt trauma abdomen [5]. The peak incidence of penetrating wound is during summer months, weekends, late night activities of knife and gun clubs. Large number of patients admitted in emergency room as victim of penetrating injury abdomen may be due to accidents or violence[6]. It is important to considering penetrating abdominal trauma to remember that any wound of thorax, back and abdomen might injure abdominal structure specially low thorax wounds. These all should be considered abdominal wounds until proved otherwise [7]. Penetrating wounds may be due to high velocity and low velocity. The common low velocity injury due to stabbing. The high velocity injury due to gunshot injuries and exploding materials fragments [8].

Roland et al (1985) reported a series of 257 patients sustained abdominal injuries of which 165 patients having gunshot wounds and 92 patients having injury due to stab.

The severity of penetrating injury is difficult to diagnose but due to lack variation in its clinical manifestation it is early Diagnose. The significant mortality and morbidity of such injuries are due to inaccurate and delayed diagnosis.

The extant of injury is difficult to judge by external wound alone. The symptoms of abdominal injury may be mask by the other associated injuries to the head, chest and extremities. Stab wound of the abdomen have 30% to 40% incidence of visceral injury and gunshot injury have 80% to 90% chances of such injuries (THAL et al, 1979).

Beside emergency diagnostic procedure, clinical assessment is very important in the management of such cases. Mandatory emergency laparotomy was used to be the treatment of all penetrating abdominal wounds but most trauma centers have developed screening technique to avoid unnecessary operations in the patients without an immediate need for surgery. These techniques are close observation, peritoneal lavage and stabogram through the wound.

Aims and objective

- 1) To study the incidence of cases of penetrating injury abdomen.
- 2) To study the pre-operative and post-operative management.
- 3) To study the morbidity and mortality due to penetrating injury of abdomen.

The present study was done in all patients of penetrating trauma abdomen" admitted to the Nehru hospital, B.R.D. Medical College, Gorakhpur from May 2009 to June 2010.

Materials and methods

The present study was done in all patients of 'penetrating trauma abdomen" admitted to the Nehru hospital, B.R.D. Medical College, Gorakhpur from May 2009 to June 2010. This

study includes only patients having peritoneal breach. Medico legal charting and necessary resuscitative measure done according to need for serious patients.

Exclusion criteria: Penetrating injury abdomen in which peritoneum has not been breach.

Clinical criteria: Thorough history and examination was under taken. Every patient was subjected to detail clinical evaluation by history according to time of injury, site of injury, mode of injury, mechanism of injury and other related factors. Detailed clinical examination includes thorough per abdominal examination, local examination and exploration of local wounds[9-12].

Laboratory investigations

Some necessary investigations were done in all patients these are routine blood and urine examination, blood sugar, serum urea, serum creatinine and serum electrolyte, plain X-ray chest PA view, X-ray abdomen AP erect position, peritoneal taping, USG abdomen if needed. In all cases operative finding were noted in detail. All the organ were explored to find out any visceral injuries, all patients were followed carefully and post operative complications if found were recorded[13-15].

Results

Table 1: Time of Injury

Time of injury	No. of cases	Percentage
8 am- 2 pm	04	13.3
2 pm-8 pm	20	66.6
8 pm -2 am	5	16.6
2 am-8 am	1	3.3
Total	30	100.0

This table shows the time of injury in patient's of penetrating injury of abdomen. Maximum cases occurred in between 2pm-8pm (66.66%) and next common time was 8pm-2am (16.6%).

Table 2: Time between injury and admission

Time between injury and admission	No. of cases	Percentage
0-1 hours	4	13.2
>1-2 hours	10	33.0
>2-4 hours	11	36.3
>3-4 hours	3	9.9
>4-5 hours	1	3.3
>5 hours	1	3.3

The maximum number of patients was admitted between 2-3 hrs after injury that is 11(36.3%).

Table 3: Site of injury

Site	No of cases	Percentage
Right hypochondrium	02	6.6%
Epigastrium	04	13.2%
Left Hypochondrium	04	13.2%
Right Lumbar	06	19.8%
Umbilicus	03	9.9%
Left Lumbar	05	16.5%
Right iliac	04	13.2%
Hypogastrum	01	03.3%
Left iliac	00	00.00
Back	01	03.3%

This table shows maximum patients had injury in right lumbar area (20.00%).

Table 4: Organ Involvement

Organ	No of cases	Percentage
Stomach	02	06.6
Jujenum	03	06.6
Ileum	18	59.4
Ascending Colon	01	3.3
Sigmoid Colon	01	3.3

Liver	01	3.3
Spleen	0	0
Mesentery	03	9.9
Urinary Bladder	0	0
Vascular Injury	01	3.3
Kidney	0	0

In our study most common visceral injury due to penetrating trauma abdomen was small bowel (69.3%), colon (09.9%), mesenteric tear (09.9%), stomach (06.6%), vascular injury (03.3%) and liver injury in (03.3%).

Table 5: Clinical Feature

Symptoms/Sign	No of cases
Temperature	0
Unconscious	0
Shock	14
Vomiting	0
Pain in abdomen	30
Distension in abdomen	14
Protrusion of omentum	08
Abdominal tenderness	27
Guarding	27
Rigidity	27
Mask liver dullness	02
Absent bowel Sound	18

Most common symptom of penetrating trauma abdomen was abdominal pain that is in 30 cases (100%). Omental protrusion was present in 8 cases and distension in abdomen was present in 14 cases. 14 patients were present with shock.

Table 6: Cases of single/multiple penetrating wounds

Wound	No. of cases	Percentage
Single	28	93.33
Multiple	02	06.66

This table shows that majority of cases of penetrating trauma injury had single penetrating wounds 28(93.33%) where as multiple penetrating wounds involvement was only 02(06.66%).

Table 7: Causative Agents

Agents	No of cases	Percentage
Gunshot	14	46.6%
Knife	13	43.3%
Iron rod	01	03.3%
Bomb Blast	00	00.0%
Bull horn	00	00.0%
Scissor	01	03.3%
Other	01	03.3%
Total	01	100.00

In the following table maximum penetrating injury abdomen is caused by gunshot weapon that is 14 cases (46.6%). The next most common weapon were used in penetrating injury was knife that was present in 13 cases (43.3%).

Table 8: Associated Extra Abdominal Injuries

Associated injuries	No of cases	Percentage
Head Injury	01	03.33
Chest Injury	02	06.66
Extremities	05	16.66
Neck Injury	01	3.3
Pelvic (Bone injury)	00	00

This table shows there were total 09 patients out of 30 who were having associated extra abdominal injuries. In 04 cases having more than one associated injuries. Injury to the extremities 16.66% was the most common associated extra abdominal injury.

Table 9: Age And Sex Distribution

Age	Total	Male	Female
0-10	2	1	1
11-20	7	4	3
21-30	12	11	1
31-40	5	3	2
41-50	3	3	0
51-60	1	1	0
>60	0	0	0
Total	30	23	7

In the present series the majority of patients were between 21-30 years of age group (40.00 %). In present study out of 30 patients 23 (76.66%) were male and 07(23.34%) were female. The male: female ratio was 3:1.

Table 10: Mode of injury and age distribution

Age (in years)	Mode of Injury		
	Homicidal	Accidental	Suicidal
0-10	0	2	0
11-20	3	2	2
21-30	9	3	0
31-40	5	0	0
41-50	3	0	0
51-60	1	0	0
>60	0	0	0
Total	21	7	2

Table shows various mode of injury of penetrating injury abdomen according to the age. The homicidal accounts for maximum number of cases 21 (70.0%) followed by accidental cases 7(23.3%) and suicidal cases 2(6.6%).

Table 11: Plain x-Ray abdomen

Findings	No of cases	Percentage
Gas under right dome of diaphragm	25	82.6%
Normal	05	16.6%
Total	30	100%

The above table shows plain x-ray abdomen AP erect position in cases of penetrating trauma abdomen. Out of 30 patients 25(82.6%) having conclusive results where as 05(16.66%) having normal report.

Table 12: Abdominal Paracentesis

Result	Contents	No of cases	Percentage
Positive	Blood	19	63.33%
	faecal/bilious	02	06.33%
Negative		09	29.70%
total		30	100%

This table shows the results of abdominal paracentesis. It was done in all 30 patients and it was positive in 21(69.99%) cases and negative in 09(29.70%) cases.

Table 13: Blood Investigations

Haemoglobin (gm%)	No of cases	Percentage
>10	12	39.6%
8-10	10	30.3%
<8	8	26.4%
Total	30	

In total number of 30 cases 12 patients were having more than 10 gm% and 10 patients having haemoglobin in between 8-10 gm% and 8 patients were having less than 8 gm%.

Table 14: Operative Procedure

Operative finding	Procedure	No of cases	Percentage
Gastric perf	Primary repair	02	06.6
Jujenal perf	Primary repair	03	09.9
Ileal perf	Primary repair	09	29.7
	Primary repair with ileostomy	09	29.7
Ascending colon perforation	Primary repair with ileostomy	01	03.3
Sigmoid perf	Primary repair with ileostomy	01	03.3
Liver Injury	Abgel packing	01	03.3
Splenic Injury	Nil		
Mesenteric tear	repair	03	09.9
U.Bladder injury	Nil		
Vascular injury	Repair	01	03.3
Renal injury	nil	00	

This table shows most common visceral injury due to penetrating trauma abdomen was small bowel (69.3%).

Table 15: Postop-Complications

Complications	No of cases	Percentage
hemorrhage	0	00
Temperature	1	16.6
Chest Infection	1	66.4

Wound infection	4	16.6
Abdominal distension	1	03.3
Anastomotic leak	1	03.3

This table shows out of 30 cases operated for penetrating injury abdomen, 6 cases had post op complication and wound infection (66.4%) was the most common complication.

Table 16: Hospital Stay

Days	No of cases	Percentage
01-06	06	19.8
07-13	19	62.7
14-20	04	13.2
21-26	00	00
27-30	01	3.3
Total	30	100

This table shows the hospital stay from the time of admission to the discharge of the patients. Majority of patients (62.7 %) had total hospital stay of 07-13 days.

Table 17: Mortality Rate

Treatment	Mode of Injury	No of cases	No of death	Percentage
Operative	Gunshot	14	00	00
	Stab Injury	13	00	00
	Scissor/hasiya	01	00	00
	Iron rod	01	00	00
	Other	00	00	00
		30	00	00

This table shows the mortality of patients of penetrating trauma abdomen manage operatively. Mortality rate is 00.00%.

Discussion

The abdomen extends from the nipples to the groin crease anteriorly, and the tips of the scapulae to the gluteal skin crease inferiorly. Any penetrating injury to this area or that may have traversed this volume, should be considered as a potential abdominal injury, and evaluated as such. Incidence of penetrating trauma abdomen is rapidly increasing due to violence. The incidence of penetrating injury will vary from hospital to hospital and region to region. Some institutions will have a very low incidence of penetrating trauma, and yet it is vital that penetrating injury is treated differently to blunt trauma. This study comprises of 30 cases admitted between "May 2009 to June 2010". The incidence, age, sex distribution, agent involvement, various intra-abdominal organ involved, management, mortality and morbidity were studied.

Incidence: The incidence of penetrating trauma abdomen injury found 30 of total 2740 cases admitted in the surgical ward of B.R.D. Medical College, Gorakhpur in between "May 2009 to June 2010". Trauma most commonly occurs in younger population because of more suicidal tendency violence and intolerance, increase intake and fast driving. Males are affecting more than females. In present study 73.33% cases were males.

Mode of injury: Penetrating abdominal injuries were caused by homicidal attempts in 21 cases, accidental trauma in 07 cases and suicidal attempts in 02 cases. Penetrating abdominal injuries mostly caused by homicidal attempts. It is observe that homicidal injury most common in younger males. It is due to increase tendency of violence in younger male population. Accidental injury is also common in male population due to more work outside than females. The incidence of suicidal trauma to the abdomen was found very less. Reason behind this may be due to more other easy definitive modes of suicide are available. JOSEPH and ANIL (1980) reported the nature of incidence in 403 cases of stab injury of abdomen found that 94% of stab wounds of abdomen were homicidal 4% were accidental and 2% were suicidal. Patients admitted to the University of Calabar Teaching Hospital, Calabar with Penetrating trauma abdomen from February 2005 to January 2008 were

prospectively studied. Seventy-nine patients presented with abdominal trauma, among which 39 (49 %) were Penetrating trauma abdomen. There were 37 males and two females, whose ages ranged from 5 to 54 years (mean 27.8 years). Stab wound (18; 46.1%) was the commonest injury, while gunshot wound (15; 38.5%) ranked second. Others were road traffic accident (two patients), fall, cow horn injury, shrapnel, and criminal abortion (a patient each). The commonest injury was evisceration of the omentum and small intestine, which occurred in 13 (36%) patients. Five (14%) patients suffered small intestinal perforations, while three (8%) had liver, splenic and colonic injuries, respectively. Others were rectal injury (four patients), mesenteric injury and perforated stomach (two patients each), and a patient with diaphragmatic injury.

Depth and site of injury: This study includes all the cases in which peritoneum has been breached. The severity of stab wounds is based exclusively on the location and depth of penetration. Important consideration was included the type of weapon used (knife length, shape, straight or serrated) and manner of assault (overhand vs. underhand). The gender of the assailant may have some importance, in that women tend to stab "overhand." Penetration tends to be deeper with the "underhand" thrust. The velocity of the projectile is a more important factor than its mass in determining how much damage is done, kinetic energy increases with the square of the velocity. In addition to injury caused directly by the object that enters the body, penetrating injuries may be associated with secondary injuries

Site of injury: Site of injury in abdominal stab wound is most important factor in determination of severity of wound. Stab wounds to the upper back can involve the lung or heart. Stab wounds to the lower and middle back can involve the kidneys and/or ureters. Evaluation of stab wounds to the back that may have punctured the kidney will require intravenous pyelography for evaluation. The presence of blood in the urinalysis indicates injury to the kidney, bladder, or ureter. Trauma surgeons classify the torso into 5 main areas: chest, thoraco-abdominal, anterior abdomen, flank and back. The organs found within the peritoneal cavity can be injured by a penetrating wound in any 4 of these 5 regions. The approach to diagnosis and treatment differs and is determined by the type of weapon, either a firearm or a stab wound and the trajectory of its

entry. For the purposes of this discussion we will consider the use of the word abdomen to refer to all 4 of the above noted regions of the torso (thoraco-abdominal, anterior abdomen, flank and back). In our study maximum patients had injury in right lumbar area (20.00%).

Associated injury: Associated injury mostly present in the cases of stab injury this may be due to an attempt of protecting themselves. In our study there were total 09 patients out of 30 who were having associated extra abdominal injuries. In 4 cases was having more than one associated injuries. Injury to the extremities 16.66% was the most common associated extra abdominal injury. All the injuries were simple in nature. Penetration may abolish or diminish bowel sounds presents in 13 patients due to bleeding, infection, and irritation, and injuries to arteries may cause bruits (a distinctive sound similar to heart murmurs) to be audible. Percussion of the abdomen may reveal hyper resonance (indicating air in the abdominal cavity) or dullness (indicating a buildup of blood). The abdomen may be distended or tender, signs which indicate an urgent need for surgery. Variability presents in mode if present at ion in penetrating trauma abdomen. Pain in abdomen presents almost all cases in which 14 cases were presents with shock. All the patients were conscious and experienced pain. 08 patients were present with protrusion of omentum. Abdominal distension presents in 14 cases [15]

Conclusion

The incidence of penetrating abdominal injury was 30 cases of total cases admitted in surgical ward. The maximum patients were as a victim of penetrating abdominal injury of in between 21 to 30 years of age in which males are affected more commonly (29). Male predominated to the females. Male and female ratio was 3:1. Gunshot injury counted for maximum number of case {14} {4 6.66%} and knife was observed to be used most commonly. Penetrating Trauma Abdomen was mainly caused by Homicidal attempt 21(70.0%) cases were as suicidal attempt was found very low percentage 2(6:6%) cases. In most of the cases (19) hospital stay was between 7-13 days (62.7%). In only one case the hospital stay was more than 26 days that was because of wound gap and deep injury over chest. When wounds became healthy it was secondarily sutured

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