



**Study of the Cases of Blunt Trauma Abdomen Either Isolated or In Combination with Other Associated Injuries  
by Different Causes Attended Admitted To Department of Surgery in a Tertiary Centre**

Dr Niranjan Mardi<sup>1</sup>, Dr Asim Augustine Minj<sup>1</sup>, Dr Ramchandra Besra<sup>2</sup>, Dr(Prof.)Ranjan George Baxla<sup>3</sup>, Dr(Prof.) Pankaj Bodra<sup>4</sup>

Junior Resident (Academic)<sup>1,1</sup>, Ex Senior Resident<sup>2</sup>, Professor And Head<sup>3</sup>, Professor<sup>4</sup> Department of General Surgery,  
Rajendra Institute of Medical Sciences Ranchi, Jharkhand

**Corresponding Author:** Dr Asim Augustine Minj, Junior Resident (Academic), Department of General Surgery,  
Rajendra Institute of Medical Sciences Ranchi, Jharkhand.

**Type of Publication:** Original Research Paper

**Conflicts of Interest:** Nil

**Abstract**

**Background:** Trauma has been defined as damage to the body caused by an exchange with environmental energy that is beyond the body resilience (William Hadden)<sup>1</sup>. Thorax and abdomen are subjected to every type of injury taking in to account the anatomy, the abdomen is the most susceptible to trauma on the anterior surface between ribs and pelvis and on lateral surface (Gupta RS et al, 1962)<sup>2</sup>. Aristotle is credited as being the first to record visceral injury from blunt abdominal trauma (Vance 1923 as quoted by Griswold and Collin)<sup>3</sup>.

Trauma remains the most common cause of death for individual between aged 1 and 44 years and the third most common cause of death regardless of age (Sauaia A et al, 1995)<sup>4</sup>.

**Objectives:**

1. To evaluate the incidence and clinical presentation of blunt abdominal trauma .
2. To enumerate the different causal factors for blunt trauma abdomen in our hospital setup.
3. To evaluate mode of proper management for abdominal blunt trauma.

**Place and Duration:** Patients admitted in various surgical wards of Rajendra Institute of Medical Sciences, Ranchi having blunt abdominal trauma were included in our study. The study was conducted during the period from November 2015 to November 2017.

**Materials and methods:** The present study has been carried out in the department of surgery, at Rajendra Institute of medical Sciences, Ranchi. Observation have been made on 170 patients admitted in department of surgery, RIMS Ranchi, sustaining blunt abdominal trauma during the period from November 2015 to November 2017. There were 170 patients fulfilling Inclusion criteria with blunt abdominal trauma between 4 to 63 years of age including both sexes .Data of All the patients were collected from a specially designed Proforma pertaining to patient's particulars, clinical, examinations, investigations, diagnosis and surgical procedures. It is then subjected to statistical analysis .All the surgical procedures & medical management and investigations were conducted under direct guidance and supervision of our Guide. Before start of our study, a written/informed consent was obtained in local vernacular in each patient.

**Results:** out of 170 patients suffering from abdominal injuries, 44% patients belonged to blunt trauma, while 56% of patients were of penetrating injuries. the maximum incidence of blunt abdominal trauma found in the age group 21-30 years. The youngest patient was of 4 years and the oldest was 63 years. that 88% cases were male and 12% cases were of female showing with a male:female ratio of 7:1. The most common cause of blunt abdominal trauma was road traffic accident comprising 58% of patients, blow and impact by blunt object accounted for 16%, fall from height 14%, industrial accident 9% and sports injury 3%. 65% of cases of blunt abdominal trauma is an isolated injury while in 35% of cases it is associated with other organ injury. That out of 74 cases of blunt trauma injuries, 50 cases (68%) were caused by various types of accident while 24 cases (32%) were caused by assault. Out of 74 cases, 35 (47%) cases were treated conservatively while 39 patients (53%) were treated by operative procedure.

**Conclusion:** Incidence of blunt abdominal trauma is increasing due to increase in civil violence, road traffic accident, industrial accident, terrorist activities etc. Road traffic accident accounts for maximum number of cases. Mortality can be reduced if early diagnosis and subsequently resuscitation followed by definitive treatment. Any delay in operation on deserving patients of the blunt abdominal trauma imposes an increasing danger to the life of patients.

**Keywords:** Blunt trauma abdomen, Road traffic accident, Spleen and liver, ultrasonography, diagnostic tapping, early diagnosis and subsequently resuscitation followed by definitive treatment.

## Introduction

Trauma has been defined as damage to the body caused by an exchange with environmental energy that is beyond the body resilience (William Hadden)<sup>1</sup>.

Thorax and abdomen are subjected to every type of injury taking in to account the anatomy, the abdomen is the most susceptible to trauma on the anterior surface between ribs and pelvis and on lateral surface (Gupta RS et al, 1962)<sup>2</sup>. Aristotle is credited as being the first to record visceral injury from blunt abdominal trauma (Vance 1923 as quoted by Griswold and Collin)<sup>3</sup>. Trauma remains the most common cause of death for individual between aged 1 and 44 years and the third most common cause of death regardless of age (Sauaia A et al, 1995)<sup>4</sup>.

The exact prevalence of blunt abdominal injury among trauma admission is unclear however the prevalence reported in the international literature range from 6% to 65% (Stengel, 2003)<sup>5</sup>. The majority of death from injury occur in economically productive person aged 14-44 years and the male to female ratio for deaths from violence is 2:1. Deaths from injury are predicted to rise by 65% by the year 2020 by which road traffic accident will be third most important cause of death worldwide and second most important in developing nation (Bailey's & Love's, 24<sup>th</sup> Ed.)<sup>6</sup>.

Incidence of visceral injury is reported to be 30 to 40% in stab injury whereas it goes up to 90% in high velocity missile injury (Lawe et al, 1972)<sup>7</sup>. Blunt trauma is a very common mechanism of injury to abdomen. The following may be cause of injuries: Traffic accident (motor vehicle accident), Domestic accidents, Blow or impact of blunt object, Fall from height e.g. Tree and building, Accident due to natural calamities, Mining and all allied accident.

Other cause of blunt trauma abdomen is seat belt injury (Baker AR et al, 1986)<sup>8</sup> and even vigorous resuscitation can lead to blunt trauma abdomen (A case report, Br. J. Anesth 1986:58)<sup>9</sup>.

Gupta S et al (1996) documented that automobile accident are the main cause of blunt trauma abdomen<sup>2</sup>.

Studied in National University hospital surgery Ong CL et al in 1994 and found that the most common cause of

abdominal injuries are road traffic accident followed by stab wounds or fall from height<sup>10</sup>.

Gupta S et al (1996)<sup>2</sup> concluded that a multi-pronged approach towards early diagnosis and vigorous management should be adopted to reduce the morbidity and mortality in patient with blunt abdominal trauma.

The patient who has free air on abdominal X-ray needs urgent laparotomy rather than an attempt to localize the organ rupture. Similarly the patient with hypotension left upper quadrant pain and a positive peritoneal lavage needs surgery immediately due to possible rupture of spleen, where there is right upper quadrant tenderness with fracture of 7-9<sup>th</sup> rib on right side there is a doubt for liver injury (Argyle B, 1996)<sup>11</sup>.

Blunt injuries are thought to result from severe crushing, deforming, stretching and sheering force. The magnitude of these force are directly related to the mass of object involved the rate of their acceleration and deceleration, the relative direction on impact whether the hollow viscus was full or empty at the time of injury (Maingot, 7<sup>th</sup> Ed. 1997)<sup>12</sup>.

At the trauma USG is mainly used in term of focused assessment of sonography for trauma (FAST) to detect the presence of free fluid as an indicator of organ injury (Scalea, 1999)<sup>13</sup>.

Hughes TM (1999) documented that most accurate and safest method of assessment of the abdomen in haemodynamically unstable patient with suspected abdominal injury following blunt trauma are immediate laparotomy or diagnostic peritoneal lavage. In stable patient CT scan of the abdomen is better than the other modalities of assessment available<sup>14</sup>.

Helical Computed Tomography (CT) is widely considered as the diagnostic imaging standard in the trauma setting (Jhirad, 1998; Livingstone, 1998; Linsonmaier, 2002)<sup>15</sup>.

Ultrasonography is a quick, non-invasive, repeatable and nevertheless inexpensive tool that has emerged as a key

component of diagnostic algorithms and clinical pathway (Benlarger, 2000; Baka 2002)<sup>16</sup>.

The present study had been undertaken with following aims and objectives: -

To analyze critically the different cause of the blunt trauma abdomen, There course and prognosis of such blunt trauma of abdomen, Most suitable ways of management of such cases either conservatively or by operative methods and thereby minimises the morbidity and mortality in such cases.

### Methodology

The present study has been carried out in the department of surgery, at Rajendra Institute of medical Sciences, Ranchi. Observation have been made on 170 patients admitted in department of surgery, RIMS Ranchi, sustaining blunt abdominal trauma during the period from November 2015 to November 2017.

The cases were evaluated in details and case records were prepared as follows:

1.Total number of admission in surgical emergency of Rajendra Institute of Medical Sciences, Ranchi during the period of study 2.Total number of abdominal injuries during the period.3.Type of abdominal injury (in percentage) .A.Blunt abdominal trauma.B.Penetrating abdominal trauma.Associated injuries to other organs.Detailed studies of causative agent: Road traffic accident,Fall from height e.g. tree, building,Blow or impact by blunt object,Industrial accident,Domestic accident,Accident due to natural calamities,Mining and allied accident,Duration of injuries and its effects on overall results. The prognostic outlook of patients depends on the time interval between time of injury and starting of treatment. The time duration were made as follows :0-6 hours,6-12 hours,12-24 hours or onwards.

### Patient's details

**Name and address:** Regd. No.: Age, Sex & Religion:  
Occupation:

## Complaints with duration

**Pain abdomen:** Site, nature and severity of pain, Distention of abdomen, Vomiting, Passage of flatus and faeces and urine, Haematuria, Tenderness and rigidity, Feature of shock, Associated injuries, Nature and timing of any meal before the incidence, Presence or absence of shoulder tip pain indicating diaphragmatic irritation-Kehr's sign.

## Diagnostic clinical examination

Pulse rate, volume and rhythm .Blood pressure, Tachycardia, sweating feature of shock, Pallor, Area of tenderness and rigidity ,Liver dullness obliteration to exclude perforation of hollow viscus , Percussion note, Bowel sound, Urinary output and colour of urine, State of consciousness ,Tongue- dry or moist ,Balance sign for splenic injury, Cullen's sign

## Special investigations

Haematological examination, Plain X-ray abdomen- erect and supine, Diagnostic peritoneal tapping with 4 quadrant aspiration, USG of whole abdomen whenever necessary, CT scan of abdomen in selected cases, Emergency intravenous pyelography in selected cases, Urethral catheterization whenever indicated, Examination of associated injuries.

**Management:** Guided by the findings of clinical examination, investigation and after reaching a diagnosis, if emergency laparotomy is needed then it was done and surgical intervention were done according to the need of the cases. Details of intraabdominal injuries and their repair were recorded.

**Postoperative:** Patients was managed Postoperative as per their need.

**Result and follow up:** All cases were followed up closely and the observation on various aspects of these cases observed, were recorded. The occurrence of morbidity and mortality were precisely recorded. The results of the treatment were categorized as: cured, relieved, died.

The data collected in this way have been represented in tabular form. The data were compared with those of various workers having worked on this aspect of the problem in available literature.

**Results:** The observation on various aspect of blunt abdominal injuries were recorded and being presented here in various tables.

Table – I -Ratio of Blunt Abdominal Injury To Total Number of Abdominal Injuries.

Type of injury	No. of cases	Percentage
Blunt	74	44
Penetrating	96	56
Total	170	100

The above table shows that out of 170 patients suffering from abdominal injuries, 44% patients belonged to blunt trauma, while 56% of patients were of penetrating injuries.

Table – II Age Wise Distribution Of Patients Of Blunt Abdominal Trauma.

Age group (in years)	No. of cases	Percentage
01 – 10	4	5
11 – 20	14	19
21 – 30	35	47
31 – 40	10	14.3
41 – 50	7	9
51 – 60	3	4.4
Above 60	1	1.3
Total	74	100

The above table shows that the maximum incidence of blunt abdominal trauma found in the age group 21-30 years. The youngest patient was of 4 years and the oldest was 63 years.

TABLE – III Sex Incidence Of Cases Of Blunt Abdominal Trauma

Sex	No. of cases	Percentage
Male	65	88
Female	9	12
Total	74	100

The above table indicates that 88% cases were male and 12% cases were of female showing with a male: female ratio of 7:1.

TABLE – IV: Incidence of Causative Factor of Blunt Abdominal Trauma

Mode of injury	No. of cases	Percentage
Road traffic accident	43	58
Blow or impact by blunt object	12	16
Fall from height	10	14
Industrial accident	7	9
Sports injury	2	3
Total	74	100

The above table indicates that the most common cause of blunt abdominal trauma was road traffic accident comprising 58% of patients, blow and impact by blunt object accounted for 16%, fall from height 14%, industrial accident 9% and sports injury 3%

Table - V- Showing Whether Blunt Abdominal Trauma Is an Isolated Injury or Associated With Injury to Other System.

Type of injury	No. of cases	Percentage
Isolated abdominal injury	48	65
With associated injury	26	35
Total	74	100

The above table indicates that 65% of cases of blunt abdominal trauma are an isolated injury while in 35% of cases it is associated with other organ injury.

Table – VI -Incidence of Type of Violence Causing Blunt Abdominal Trauma.

Causative factor	No. of cases	Percentage
Accident	50	68
Assault	24	32
Total	74	100

The above table shows that out of 74 cases of blunt trauma injuries, 50 cases (68%) were caused by various types of accident while 24 cases (32%) were caused by assault.

TABLE – VII- Period of Reporting To Hospital after Trauma.

Period of injury (in hours)	No. of cases	Percentage
0 – 6	21	28
6 – 12	32	43.5
12 – 24	15	20.5
Above 24	6	8
Total	74	100

The above table indicates that maximum number of patients 32 cases (43.5%) came between 6 to 12 hours after injury. 28% came between 0 to 6 hours and 20.5% of patients reached the hospital between 12 to 24 hours after injury. After 24 hours 8% patients reached the hospital.

TABLE – VIII-Incidence of Associated Injuries.

Injury	No. of cases	Percentage
Skeletal fracture	13	50
Multiple organ injury	6	23
Head injury	4	15
Chest injury	3	12
Total	26	100

The above table indicates the associated injuries 50% patients were associated with fracture of bones, 23% associated with multiple injuries, head injury and chest injury were associated with 15% and 12% respectively.

TABLE – IX-Clinical Features

Clinical features	No. of cases	Percentage
Pain abdomen	64	86
Vomiting	53	72
Peritonitis	36	49
Shock	26	35
Distention of abdomen	24	32
Haematuria	5	7

This table shows that 86% of patients presented with pain abdomen. Other types of presentation were vomiting 72%, distention of abdomen 32%, peritonitis 49%, shock 35% and haematuria 7%.

Table – X-Involvement of Abdominal Organ – 61 Cases

Organ involved	No. of cases	Percentage
Spleen	16	26
Liver	14	23
Kidney	6	10
Ileum	5	8
Mesentery and vessel	5	8
Colon	4	7
Duodenum	2	3
Jejunum	2	3
Omentum	2	3
Pancreas	2	3
Stomach	1	2
Urinary bladder	1	2
Diaphragm	1	2



This table shows that about 210% of patients had injuries of hollow viscus in which ileum ranked the highest (8%), duodenum (3%), jejunum (3%). Splenic injuries were found in 26%, liver ranked the 2<sup>nd</sup> carrying 23% of patients, renal injuries (10%) and pancreatic injuries were observed in 3% of patients. Urinary bladder injuries were 2%, diaphragm 2%. Mesenteric vessels injuries occurred in 8% of patients. Omental injuries were found in 3% of patients.

TABLE – XI -Evaluation of stable and unstable patients on the basis of clinical feature

Clinical features	No of cases	Percentage
Blood pressure systolic <90 mm Hg	12	16
Pulse rate >100/mt	16	22
Respiratory rate >25/mt	12	16
Urine output <0.5 ml/kg/h	12	16

This table shows that 16% of patient presented with blood pressure systolic <90 mm Hg, Respiratory rate >25/mt, urine output 0.5 ml/kg/h, and 22% patient presented with pulse rate >100/mt, i.e. about 16% patient are haemodynamically unstable requiring emergency laparotomy. Stable patient evaluated by different investigation.

TABLE – XII- Investigation Done In Patient.

	X-ray abdominal in erect posture	USG (Excluding 11 cases which shows free gas under diaphragm)	Haematological examination		DPA (Diagnostic Peritoneal aspiration)	CT scan
			Hb%	Serum electrolyte + serum amylase		
Total no. in which investigation had been done	65	51	60	18	33	6
No. of cases showing positive finding	Free gas under right dome of diaphragm-11 Ground glass appearance-08 Evidence of lower rib #5 Renal outline enlarged-02	Collection in peritoneal cavity-16 free gas in peritoneum-1 Splenic injury-14, liver injury-11, subcapsular haematoma in kidney-03	Hb% less than 8-16	Abnormal serum electrolyte-2 serum ca-1, serum amylase -3	Haemoperiton eum-19 Bile mixed with blood-06 Negative aspiration-8	Distortion of splenic outline-3 Distortion of pancreatic outline-2 Collection in lesser sac- 1

The above table shows the incidence of investigation done in blunt trauma abdomen. X-ray abdomen in erect posture showed positive finding in 62 cases of abdominal injuries, DPA in 33 cases, haematological examination 60 cases,

ultrasonography in 51 cases and CT scanning 6 cases.

TABLE – XIII-Type of Management Done.

Type of management	No. of cases	Percentage
Conservative	35	47
Operative	39	53
Total	74	100

The above table indicates that out of 74 cases, 35 (47%) cases were treated conservatively while 39 patients (53%) were treated by operative procedure.

TABLE – XIV-Primary Indication Of Operation ( 39 Cases).

Indication of operation	No. of cases	Percentage
Sign of peritoneal irritation	14	36
Haemoperitoneum	11	28
Radiological evidence	11	28
Haematuria and urinary retention	3	8

The above table shows that out of 39 cases in 36% of patients, the primary indication of operation was sign of peritoneal irritation, in 28% of patients, it was haemoperitoneum, in 28% it was radiological evidence. 8% of patients were operated due to haematuria and urinary retention.

TABLE – XV-List Of Operative Procedure – 39 Cases

Operative procedure	No. of cases	Percentage
Splenectomy	6	15
Closure of hollow viscus	9	23
Repair of liver injury	8	21
Repair of spleen	5	13
Colostomy	4	10
Resection and anastomosis of gut	3	8
Repair of urinary bladder	1	2.5
Nephrectomy	1	2.5
Negative laparotomy	1	2.5
Repair of diaphragm + splenectomy	1	2.5

This table indicates that out of 39 cases, repair of gut was performed in 12 patients (31%) of which, in 23% cases closure of perforation and in 8% of patients resection and anastomosis was needed. 5% of patients underwent splenectomy and in 13% of cases splenorrhaphy was needed. In 23% of patients, repair of liver injury were done. Repair of urinary bladder and nephrectomy were needed in 5% of patients. 3% of patients were operated as

negative laparotomy. 10% of patients underwent temporary colostomy, 2.5% of cases need repair of diaphragm and splenectomy.

TABLE – XVI-Post Operative Complications

Complication	No. of cases	Percentage
No complication	29	74
Pulmonary complication	2	5
Stitch abscess	2	5
Septicemia	2	5
Intestinal obstruction	1	3
Faecal fistula	1	3
Intraabdominal haemorrhage	1	3
Renal failure	1	3

The above table indicates that 29 patients i.e. 74% had no complication while 10 patients (26%) had, out of which most common was septicemia, pulmonary complication and stitch abscess comprising 2 cases each (5%), intraabdominal haemorrhage, renal failure, Faecal fistula, and intestinal obstruction was found in 1 cases each (3%).

TABLE – XVII-Overall Mortality Rate.

Total no. of cases	Cured	Percentage	Death	Percentage
74	69	93	5	7

This table shows that out of 74 cases observed, 69 cases were cured (93%), 5 patients died carrying 7% mortality rate.

TABLE – XVIII-Period Wise Mortality Rate – 5 Deaths.

Period of death	No. of cases	Percentage
Died during resuscitation	1	20
Died during operation	1	20
Post operative mortality	3	60
Mortality after negative laparotomy	0	0

The table shows that post operative mortality was highest which was 60%. 20% and 20% of patients died during resuscitation and during operation respectively. Death after negative laparotomy was 0%.

TABLE – XIX-Cause of Mortality

Cause	No. of cases	Percentage
Post operative		
Septicemia	1	20
Renal failure	1	20
Pulmonary complication	1	20
Per operative		
Complication of anaesthesia	1	20
Pre operative		
During resuscitation	1	20

The above table shows the cause of mortality. The most common cause post-operatively was septicemia (40%) followed by renal failure (20%) and pulmonary complication (20%). Per operative mortality was due to complication of anaesthesia while pre operative mortality was due to severe shock.

## Discussion

The present study was undertaken during the period November 2015 to November 2017, to make a comprehensive study of blunt abdominal trauma as regards its various aspects like cause of injury, organ involved, management procedure and mortality & morbidity. Incidence -It has been observed that there is a rising trend of occurrence of blunt abdominal trauma, however penetrating abdominal trauma (56%) outnumbered blunt abdominal trauma (44%) (Table-I). In previous study, Conn et al (1961)<sup>17</sup> observed blunt injury in 36.1% cases and penetrating injuries in 83.9% of cases while Yong (1983)<sup>18</sup> observed blunt injuries 40%, penetrating injuries 60%, Adkins (1984)<sup>19</sup> reported that 50% of blunt injuries and 50%, penetrating injuries. Ong DJ (1994)<sup>20</sup> observed an incidence of blunt abdominal trauma 74% as compared to total number of blunt abdominal injuries.

Miller SG (1991) observed that there had been a tenfold increase in terrorist activities around the world in the past 10 years<sup>21</sup>. Mohapatra Srikant et al (2003) observed an incidence of blunt abdominal trauma 44% as compared to total number of blunt abdominal injuries<sup>22</sup>.

In my study the incidence of blunt abdominal trauma 44% approaching similar to that of the other workers. The incidence of blunt trauma abdomen is slightly high because of the facts that urbanization and industrialization leading to an increase crime graph which mainly constitutes an increase incidence of stab injury, fire arm injuries etc. Also increase incidence of naxalite activity in this region in recent years has led to increase incidence of such injuries. Further, increased terrorist activities are also considered a contributory factor.

Age incidence and Sex incidence: From observations of table II and III, it is evident that the most common age for blunt abdominal trauma is between 21-30 years of age (47%) and incidence is minimum at the extremes of age. Male have predominated the female (male- 88%, female-12%). Allen et al (1957) and Botton et al (1973) found a lower percentage of male victim which they have explained due to greater participation in outdoor activities by the females. In other studies, males have been shown to have a higher incidence<sup>23</sup>. Patnaik (1991) found that 80% of patients of blunt abdominal trauma was under 40 years of age. Ong CL in 1994 found that it was more common in the age group of 1-44 years of age. Talwar S (1996) in his study found that it was most common in the age group 21-30 years and more common in males. The observation made in the above study are similar to those of other workers. This justifies the fact that youths are more violence prone. Mohapatra Srikant et al (2003) in his study found that more than 3/4<sup>th</sup> of the victim were in the first four decade of their lives, with the majority (33.3%) belonging to the 21-30 years age group, male: female ratio 7:1<sup>22</sup>. Richard P. Gonzalez et al (2004) reported the patients of blunt abdominal trauma with the average age of 32 years (range 14-81).

In my observations, male were found to outnumber females probably because of the facts that males participate more in outdoor activities.

In my study the commonest age group of blunt trauma victim was 21-30 years (47%), which was similar to the other workers.

Causative factors of injury: Observation of table IV shows causative factors of blunt abdominal trauma. It indicates that 58% of cases were due to road traffic accidents. This was consistent with the observation of Adkin (1984) and Kivioja (1985) who found that 70% and 65% of cases respectively were due to road traffic accident<sup>24</sup>. Maingot (1997) reported that more than half of trauma related deaths are due to motor vehicle accident<sup>12</sup>. Mohapatra Srikant et al (2003) reported that road traffic accidents were the most common etiology (62%) mostly involving pedestrians or two-wheeler rider (combined 47%)<sup>22</sup>. Thus observation in present study, correlates well with the observation of most of the workers. However, incidence of motor vehicle accident is increasingly rising these days due to increased number of high speed vehicle and bad condition of roads leading to increasing incidence of blunt abdominal trauma.

Associated injury: In my study, the incidence of associated injuries with blunt trauma abdomen was 35% and among them, the commonest associated injury was skeletal fracture (50%) as shown in table V and VIII. Karnie (1972) reported that the extremities were involved in 65% of cases of road traffic accident, along with blunt trauma injuries<sup>25</sup>. Similar observation was of Kivioja (1989). Mohapatra Srikant et al (2003) reported that Chest injury was the most common associated extraabdominal injury (26%) followed by head injury and other bony injuries (21% each)<sup>22</sup>. Richard P. Gonzalez et al (2004) reported that splenic injury and small bowel mesenteric haematoma were involved along with blunt trauma injuries<sup>26</sup>. In this study too, most common cause of blunt abdominal trauma was road traffic accidents. Hence, associated common injuries were fracture of extremities. Though other associated injuries like that of chest, head was observed in



less number of cases and the commonest is skeletal injury due to greater no of two wheeler accident who are exposed to direct blunt object.

Incidence of type of violence causing blunt abdominal trauma: Table VI shows that accident (68%) is the predominant cause of blunt trauma abdomen as compared to assault injuries (32%). Different types of accident have been found responsible for the 68% of blunt trauma in my series. This percentage has been a bit different with other workers depending upon the different factors like the law & order and traffic condition of the area.

Period of reporting to hospital after trauma: In my study maximum number of patients (43.5%) reported to the hospital between 6 to 12h followed by second group 28% of cases who reported within 6h as shown in table VII. A delay in reporting to the hospital for specialized investigation and definite treatment is directly proportion to prognosis of the disease. A delay in reporting more than 24h has been found proportionally responsible for bad outcome.

Incidence showing clinical features :As observed in table IX, the most common presenting features were pain abdomen in 86%, followed by vomiting 72%. Feature of peritonitis occurred in 49% of patients. Shock, distention of abdomen and haematuria occurred in 35%, 32% and 7% respectively. Haematuria has been observed only when associated with urogenital injury. Joe et al (1976) reported that most common presenting feature in blunt trauma abdomen was generalized abdominal tenderness and rigidity (75%)<sup>27</sup>. Gupta S (1996) reported that most common presenting features was pain abdomen and vomiting<sup>28</sup>. My observation is consistent with that of previous workers.

Incidence of involvement of abdominal organ: Involvement of different organs in blunt abdominal trauma as shown in table X is spleen being the commonest organ (in 26% of cases). Liver ranked the 2<sup>nd</sup> (23%).

Involvement of small intestine was in 14% of patients in which ileum was in 8%, jejunum in 3%, duodenum 3%. Renal injury occurred in 10% of cases, pancreas in 3%, urinary bladder 2% and diaphragm injury in 2%. Mesenteric vessels was traumatized in 5% of cases. Fisher (1998) found that spleen, liver and small intestine are common organ involved in blunt abdominal trauma.<sup>29</sup>.. Ong CL (1994) observed that spleen and liver were the most commonly involved organ in blunt abdominal trauma<sup>10</sup>. Gupta RK (1996) observed the liver was the commonest organ involved in blunt trauma. Arygle B (1996) observed that spleen is the most commonly involved organ in blunt abdominal trauma<sup>11</sup>. Thus the observation made by us are comparable with the report of other workers.

Incidence of investigation and Diagnostic finding: Observation table XII showed the type of investigation done in blunt trauma abdomen. X-ray abdomen in erect posture was done in 62 cases out of which only 11 cases had free gas under right dome of diaphragm, 8 cases had ground glass appearance and 15 cases had evidence of fracture of ribs. In 2 cases, there was injury to hollow viscus but free gas under right dome of diaphragm was not seen on X-ray abdomen in erect posture. This may probably due to leakage of small amount of gas which was absorbed or may also be due to small perforation which sealed off spontaneously by omentum of flakes. Peritoneal tapping was done in 33 patients. In 19 patients haemoperitoneum was found while in 06 patients bile mixed with blood was present. This was consistent with findings after laparotomy. In 8 patients tapping was negative and they were not subjected to operation. Haematological examination had been done in 60 patients in which 16 patients had haemoglobin less than 8 gm%. Serum electrolyte, serum calcium and serum amylase were done in 18 patients suspected of pancreatic injury. Abnormal serum electrolytes in 02 cases and raised

serum amylase in 03 cases are found. Ultrasound examination has been done in 51 patients showing finding like haemoperitoneum, free gas in peritoneum, distortion of splenic outline. Sonographically in 10 cases splenic injury was suspected and all were confirmed at laparotomy. CT scan was done only in 6 patients suspected of pancreatic injury and splenic injury detecting distortion of pancreatic outline in 2 cases with collection in lesser sac. 3 patients showed distortion in splenic outline. Curie et al (1964) found that the abdominal X-ray was helpful in diagnosing 80% of cases of abdominal injury<sup>30</sup>. Argyle B (1996) observed that the diagnosis of bowel rupture was made by finding free air on abdominal X-ray<sup>11</sup>. Maingot (1997) believed that DPL remained an integral part of evaluation of the critically ill patients<sup>12</sup>. Trupk A (1998) concluded that the standard diagnostic technique in blunt abdominal trauma was sonography, assisted by computed tomography<sup>31</sup>. Muckenney KL (1999) observed that sonography has been shown to be comparable with diagnostic peritoneal lavage and CT for the detection of haemoperitoneum and superior to both modalities because of its rapidity non-invasiveness, protability and cost<sup>32</sup>. Diagnostic peritoneal lavage has remained the slandered initial diagnostic investigation for more than 25 years, although regarded as safe technique with high sensitivity (Hodgson, 2000b)<sup>33</sup>. Mallik Kshitish et al (2000) reported that abdominal CT scan is useful in evaluating the stable patient with blunt abdominal trauma, in the unstable patients the abdomen is evaluated by the physical examination and ultrasound. Selected patients (cardiovascular stability) may be evaluated by the CT scan. The CT scan is useful for identifying splenic, hepatic lesions and retroperitoneal haemorrhage<sup>34</sup>. Killeen KL et al (2001) reported that Helical CT scanning is very accurate in detecting bowel and mesenteric injuries, as well as in determining the need for surgical exploration in bowel injuries. However, it is less accurate in predicting

the need for surgical exploration in mesenteric injuries alone<sup>35</sup>. Sriussadaporn S et al (2002) stated that diagnostic peritoneal lavage or FAST scan (focused abdominal sonography for trauma) is useful to determine the presence of free intraperitoneal fluid<sup>36</sup>. A recent cohort study has reported a surprisingly low 42% sensitivity for ultrasound (Miller 2003)<sup>21</sup>.

In the present series, X-ray as helpful in diagnosing gastrointestinal tract injuries. Diagnostic peritoneal lavage had given positive finding in all cases. Ultrasound was helpful in detecting intra-abdominal injury particularly spleen and pancreas. In my study, X-ray was employed as most common investigation followed by ultrasonography and diagnostic peritoneal aspiration. In my series results are comparable with other observations made by different workers.

#### **Indication of operation and type of management**

Observation of table XIV showed the indication of operation. In our study, peritonism was indicated for operation in 36% of patients, haemoperitoneum in 28% (by tapping), radiologic evidences in 28% and haematuria and urinary retention in 8% of patients.

Table XIII indicated the type of management done in blunt abdominal trauma. In our series, 47% of patients were treated conservatively while in 53% of patients operation had been done.

Chung Hue (1992) advocated non-operative management for liver trauma but he suggested further evaluation of patients with liver injury<sup>37</sup>.

Gupta S (1996) studied in 63 cases in which operative procedure was carried out in 43 cases. Rest of the patients were managed conservatively<sup>28</sup>.

In our series, a number of patients came with post traumatic pain abdomen which had no finding in investigations. They had been treated conservatively. Those patients who had positive finding were managed by operative treatment.

### **Abdominal injury management (Operative procedure)**

Out of 74 patients of blunt trauma abdomen, 39 patients underwent laparotomy. From observation table XV, it is evident that closure of hollow viscus were done in 23% cases, resection and anastomosis were done in 8% cases, splenectomy in 15% cases, splenorrhaphy in 13%, repair of liver injury in 21% cases, repair of urinary bladder injury in 2.5% cases, nephrectomy in 2.5% cases, colostomy in 10% of cases and repair of diaphragm with splenectomy in 2.5% case.

**Postoperative complication:** Table XVI shows that 74% of patients had uneventful recovery and 26% of the cases postoperative complications developed. The most common postoperative complication was septicemia (5%) and pulmonary complication (5%) followed by intestinal obstruction (3%), wound infection (3%) and faecal fistula (3%). Renal failure, intra abdominal haemorrhage developed in 3% of patients.

The higher proportion of postoperative complication with blunt abdominal trauma is explained by the fact that such patients usually reports very late and are submitted to operation very late due to delay in diagnosis and operation. Patients reporting beyond 24 hours had more septic complication.

### **Incidence of mortality and causes of mortality**

From table XVII, it is evident that out of 74 patients observed 60 patients (93%) became cured and 5 patients (7%) died. From table XVII, it became clear that out of 5 patients died, one patient (20%) died during resuscitation, one patient (20%) during operation; postoperative mortality was 60% (3 cases). The patients died during resuscitation was due to severe shock which could not be revived. One patient died due to complication of anaesthesia as it was high risk patient. One patient died postoperatively due to pulmonary complication. 2<sup>nd</sup> patient developed faecal fistula, subsequently electrolyte

imbalance and renal failure. 3<sup>rd</sup> patient died postoperatively after splenectomy due to septicemia. Divincenti (1968) reported 23% mortality in his study<sup>38</sup>. Kiviojia (1989) reported the hospital mortality for traumatic patients was 11.9%<sup>39</sup>. Goyal A (1996) reported 11.11% mortality rate in his study<sup>40</sup>. So mortality rate in our series is in between as observed by the other workers.

**Conclusion-** The present study comprised of observations on 74 patients with blunt trauma abdomen admitted in Rajendra Institute of Medical Sciences, Ranchi. The salient features of present study are: Blunt trauma constituted 44% of total cases of abdominal injury while penetrating trauma comprised of 56% of cases. Maximum numbers of patients were between 21 to 30 years of age and male 88%. The male female ratio was 7:1. Accidents accounted for 68% of patients of which road traffic accident was the main cause (58%). Spleen (26%) and liver (23%) were found to be the commonest viscera injured in blunt trauma abdomen. X-ray was diagnostic in most cases of gastrointestinal tract perforation. Ultrasonography examination of the abdomen has proved to be most valuable tools for diagnosis of solid viscera. The diagnostic tapping of different quadrants of the abdomen have been quite helpful for an earliest bedside clinical diagnosis of blunt trauma abdomen. Emphasis has been laid on early clinical diagnosis, quick resuscitation and unhesitated laparotomy. Most of the patients required laparotomy either immediately or subsequently. There is increasing trend towards conservative treatment for stable patient if close intensive monitoring is available. Overall mortality rate was 7%. Incidence of blunt abdominal trauma is increasing due to increase in civil violence, road traffic accident, industrial accident, terrorist activities etc. Road traffic accident accounts for maximum number of cases. Mortality can be reduced if early diagnosis and subsequently resuscitation followed by definitive treatment. Any delay in operation on deserving patients of

the blunt abdominal trauma imposes an increasing danger to the life of patients.

**Acknowledgement:** We want to thank patients for their co-operation

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