



AN EPIDEMIOLOGICAL STUDY ON ABDOMINAL TRAUMA AND ITS MANAGEMENT IN A TERTIARY CARE HOSPITAL, WEST BENGAL

General Surgery

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ABSTRACT

Background: In India more than ten lakh people are injured and about a lakh people die each year due to RTA. It causes the country to lose around 55,000 crores annually accounting 2-3% of GDP. Abdominal trauma is one of the most common causes of injuries caused due to road traffic accidents.

Aim: To study the age, gender, organs commonly injured latent period, surgery and recovery of trauma patients attending North Bengal Medical College from May 2017 to April 2018.

Methods And Materials: All patients attending OPD and Casualty of Department of General Surgery with Blunt abdominal trauma and gave consent for intervention were studied totalling 60. Patients brought dead following abdominal trauma and patients not giving consent for further intervention were excluded.

Conclusion: Young, productive working males were most commonly involved in RTA. Delay in attending hospital affected the prognosis. Small Intestine was the most commonly affected organ followed by Spleen and Liver. USG and CT allowed proper assessment and grading of organ injury and allowed conservative management in some patients. In spite of best efforts there was mortality mostly due to late intervention.

KEYWORDS

Abdominal Trauma, RTA, Management

INTRODUCTION:

Approximately 1.35 million people die each year as a result of road traffic accidents (WHO). In India more than ten lakh people are injured and about a lakh people die each year due to RTA. It causes the country to lose around 55,000 crores annually accounting 2-3% of GDP¹. Abdominal trauma is one of the most common causes of injuries caused due to road traffic accidents. The rapid increase in motor vehicles and its aftermath has caused rapid increase in number of victims to blunt abdominal trauma. Motor vehicle accidents account for 75 to 80 % of blunt abdominal trauma. Blunt injury of abdomen is also a result of fall from height, assault with blunt objects, sport injuries, industrial mishaps, bomb blast and fall from riding bicycle.

Blunt abdominal trauma is usually not obvious. Hence, often missed, unless, repeatedly looked for. Due to the inadequate treatment of the abdominal injuries, many of the cases turn fatal. The knowledge in the management of blunt abdominal trauma has progressively increased due to the in-patient data gathered from different parts of the world. In spite of the best techniques and advances in diagnostic and supportive care, the morbidity and mortality remains at large. The reason for this is due to the interval between trauma and hospitalization, delay in diagnosis, lack of appropriate surgical treatment, post operative complications and associated trauma especially to head, thorax and extremities.

RTAs have huge impact on disability adjusted life years (DALYs). It has been predicted that by 2020 global death rates from RTAs will rise by 67%. This study of the cases of blunt abdominal trauma with reference to the patients presenting at North Bengal Medical College and Hospital, Darjeeling will give a deep insight into RTAs in North Bengal and adjoining areas of North Bihar, Assam, Nepal, Bhutan and Bangladesh.

OBJECTIVES OF THE STUDY:

1. To study the age and gender distribution of the patients presenting with abdominal trauma.
2. To study the presenting features (both clinical and investigations findings) of patients admitted with abdominal trauma.
3. To study the patterns of abdominal trauma and associated injuries.
4. To study the different modes of intervention among the study population.

5. To assess the outcome of patient presenting with abdominal trauma.

PATHOPHYSIOLOGY:

Sudden, pronounced increase in intra-abdominal pressure created by outward forces can cause rupture of hollow viscera or can cause burst injury of solid organs². Compression of abdominal viscera between the applied force to the abdominal wall and the posterior thoracic cage of the vertebral column can produce a crush injury³. Abrupt shearing forces can cause a tear of organs or vascular pedicles⁴. Oblique forces and deceleration injury cause shearing of viscera where anchored, such as at the duodeno-jejunal flexure and peritoneal attachments of the bowel⁵. Deceleration injuries occur in high speed vehicular accidents and in falls from great heights. On impact, the organs continue to move forward at the terminal velocity, tearing the organs at their sites of attachment.

CLINICAL EXAMINATION:

i) History And Physical Examination:

Patient's level of consciousness at the site of accident, whether the patient was under the influence of alcohol should be sought. If the patient is conscious history regarding his medications, past medical history and allergy to drugs are noted.

ii) Systemic Examination:

The major factor that determines the survival and functional outcome in most cases of blunt trauma of abdomen is the presence of the head injury.

MATERIALS AND METHODS:

Methods – Present descriptive type of epidemiological study with cross-sectional design was conducted among all patients with blunt abdominal trauma attending OPD and Casualty of the Department of General Surgery, North Bengal Medical College and Hospital between May/2017 to April/2018. After ethical approval total 60 patients were included with following inclusion and exclusion criteria.

Inclusion Criteria: a) All patients attending OPD and Casualty of Department of General Surgery with Blunt abdominal trauma b) patients who will give consent for intervention.

Exclusion Criteria: Patients brought dead following abdominal

trauma. Patients not giving consent for further intervention.

Study Variable: a) Age b) Sex c) Socioeconomic status d) Mode of presentation e) Duration of presentation after abdominal trauma f) Past H/O DM, hypertension, malignancy g) Past surgical history h) H/O drug abuse, alcoholism i) General examination: pulse, B.P, temp, abdominal tenderness, rigidity, rebound tenderness, peritonitis, j) Time required for performing the operation k) Complications during the procedure l) Cost of performing the operation m) Post-operative complications.

Study Tools: 1. Pre-designed pre-tested semi-structured schedule 2. Detailed history of the patients 3. Tools for relevant clinical examination 4. Relevant records 5. Relevant biochemical and radiological reports.

Laboratory Investigations: 1. Blood investigations (Hb%, ESR, TC, DC, LFT, Amylase, Lipase, etc) 2. Straight x-ray abdomen 3. Ultrasonography 4. Computed tomography (CT) scan.

Resources And Sources: a) Human resource – All patients presenting with abdominal trauma in the Department of General surgery, North Bengal medical College, Darjeeling. b) Material source- All the materials required for examination of the patients are available in the Department of General Surgery. c) Financial source – Majority of tests which will be done routinely at respective departments which is free of costs.

RESULTS AND ANALYSIS:

Table – 1: Distribution Of Study Subjects According To Age Groups And Gender And Mode Of Injury (N=60)

Age Group (Years)	No of Patients	Percentage (%)
0-10	1	1.6
11-20	23	38.3
21-30	20	33.3
31-40	6	10.0
41-50	4	6.6
51-60	3	5.0
61-70	2	3.3
71-80	1	1.6
Total	60	100
Gender	No of Patients	Percentage (%)
Male	53	88.3%
Female	7	11.7%
Mode of Injury	No of Patients	Percentage (%)
Road Traffic accident	36	60.0
Fall from height	16	26.7
Blunt trauma abdomen	8	13.3
Total	60	100%

After a detailed clinical evaluation and suitable investigations, 44 patients underwent exploratory laparotomy. 16 patients were selected for non operative management because they had no signs of peritonitis or they had hemoperitoneum without hemodynamic instability. Out of 16 patients, 2 patients required a delayed laparotomy after 48 hours because of deterioration in their hemodynamic status and development of signs of peritonitis.

Road traffic accident was responsible for 60% of blunt abdominal trauma cases, while fall from heights accounted for 26% of cases and blow with blunt object was responsible for 14% of injuries.

Table – 2: Distribution Of Study Subjects According To Signs And Symptoms* (N=60)

Signs	No of Patients	Percentage (%)
Abdominal tenderness	52	86.7
Abdominal guarding and rigidity	34	56.7
Rebound tenderness	19	31.7
Symptoms	No of Patients	Percentage (%)
Abdominal pain	51	85.0
Vomiting	8	13.3
Haematuria	3	5.0
Absent bowel sounds	33	55.0
Pallor	24	40.0
Pulse > 90	48	80.0
BP < 90 mm Hg systole	28	46.7
Free fluid	32	53.3

*Multiple Responses

Latent period is the interval between the time of injury to the time of surgery. Average latent period seen in the present study is between 16-20 hours. Majority of patients (30%) were taken for surgery between 11-15 hours of latent period.

Associated extra abdominal injuries were found in 35 cases. The common extra abdominal injuries were chest injuries including rib fractures, extremity fractures, pelvic fractures and head injuries.

Table – 3: Distribution Of Study Subjects According To Presence Of Extra-abdominal Injuries (N=60)

Extra-abdominal injuries	No of Patients	Percentage (%)
No any extra-abdominal injuries	25	42
Head injury	9	15
Thoracic injury	4	7
Orthopaedic injury	10	16
Soft tissue injury	6	10
Different combinations of injury	6	10
Total	60	100

Investigations Finding:

PLAIN X- RAY ABDOMEN: Plain x ray of abdomen was done in 55 cases, out of the total 60 cases. This was not done in 5 patients as the patient's condition did not permit to shift them to the x ray room or they died while being resuscitated for shock. Gas under diaphragm was found in 16 cases out of 21 bowel perforations detected at laparotomy.

Table – 4: Distribution Of Study Subjects According To X-ray Findings (N=60)

Findings	No of Patients	Percentage (%)
Gas under diaphragm (GUD)	16	26%
Enlarged soft issue shadow (ESIS)	14	25%
Ground glass appearance (GGA)	4	6%
No radiological abnormality (NRA)	21	35%
Not done (ND)	5	8%
Total	60	100%

FOUR QUADRANT ASPIRATION: Four quadrant aspiration was done in 41 patients, among which 27 cases (66%) were positive (Bloody aspirate) and 14 cases (34%) were negative.

CT SCAN EXAMINATION: A total of 16 patients were subjected for CT scan examination, out of which 12 patients had scan detected solid organ injuries for which they underwent laparotomy and found to have significant injuries. 4 patients had scan detected normal solid organs with free fluid and found to have hollow viscus injury at laparotomy.

Table – 5: Distribution Of Study Subjects According To Organ Injury* (N=60)

Organ Injured	No of Patients	Percentage (%)
Small Bowel	16	27%
Spleen	15	25%
Liver	13	22%
Stomach	2	3%
Mesentery	3	5%
Omentum	1	2%
Bladder	4	7%
Urethra	1	2%
Colon	2	3%
Retroperitoneum	6	10%
More than one organ injury	11	18%

*Multiple Responses

OPERATIVE PROCEDURES:

The following table shows the various operative procedures carried out among the patients who underwent exploratory laparotomy. Liver injuries were usually graded as I and II. Out of the 13 patients with liver injury, only 6 patients underwent hepatorrhaphy with spongistan packing and rest of them were treated with spongistan packing alone. Out of 15 patients with splenic injury, 10 patients underwent splenectomy, 3 patients were treated by splenorrhaphy and 2 were managed conservatively. Bowel perforations were treated with 2 layered closures, with only 2 patients requiring resection and

anastomosis. Omental and mesenteric injuries were treated by simple suturing and ligating the bleeding points.

Table – 6: Distribution Of Study Subjects According To Operative Procedure (N=60)

Procedure	No of Patients	Percentage (%)
Closure of perforation	15	35%
Splenectomy	10	23%
Splenorrhaphy	3	7%
Hepatorrhaphy	6	14%
Repair of mesentery	2	5%
Resection & anastomosis	2	5%
Bladder repair	3	7%
Colostomy	2	4%
Gastric Perforation Repair	1	2%
Total	44	100%

Table – 7: Distribution Of Study Subjects According To Type Of Post-operative Complications (N=15)

Type of Post-operative Complications	No of Patients	Percentage (%)
Wound Dehiscence	2	13%
Wound Infection	3	20%
Fecal fistula	1	7%
Respiratory complications	5	33%
Intra Abdominal collection	3	20%
Duodenal fistula	1	7%

***Among 60 Patients 15 Patients (25%) Developed Post-operative Complications**

Hospital Stay: The mean range of stay of patients in the hospital ranged from 11-20 days (15 days). The range varied from 2 days to 60 days.

Mortality: A total of nine patients died in the present study. Six patients belonged to operative group and died in the post operative period, majority of them due to peritonitis and septicemia. One patient died before surgery due to severe head injury. Two patients died while being managed conservatively. This shows the disadvantages of conservative management like missed injuries and delayed treatment. Therefore the mortality in the present study is 15%.

DISCUSSION:

It was seen from the study that the majority of patients belonged to 11-20 years of age group, followed by 21-30 years age group. In the study by Davis et al⁵ the majority of patients belonged to 21-30 years age group. Therefore it can be concluded that the young and the productive age group people are the usual victims of blunt abdominal trauma. It was seen that the males were the most common victims of blunt abdominal trauma. When compared to the study by Davis et al⁵ the incidence of males is much more than that of the females. In India males are the chief bread earner for the family and are involved in outdoor activities most of the times. The present study shows that 26% of the patients were managed conservatively whereas study conducted by Davis et al⁵ and Khanna et al⁶ showed 23% and 42% respectively. Non operative management is gaining increasing acceptance mainly because of the easy availability of CT scan. With the aid of CT scan it was possible to accurately grade the extent of injury to solid organs like liver and spleen. Minor lacerations and capsular tears, difficult to diagnose clinically can be easily demonstrated by CT scan and selected for non operative management. The disadvantages of non operative management are those of missed injuries and delayed treatment resulting in excessive morbidity and even mortality. In the present study, abdominal pain was the most common presenting complaint (85%) and abdominal tenderness was the most common sign (81%). But the signs and symptoms in abdominal injuries are notoriously unreliable and are often masked by concomitant head injuries, chest injuries and pelvic fractures. Significant injuries to the retroperitoneal structures may not manifest signs and symptoms immediately and be totally missed even on abdominal X-Rays. But 44% of those patients eventually required exploratory laparotomy and 34% of patients had an intra abdominal injury. This emphasizes the importance of careful and continuing observation and repeated examination of individuals with blunt abdominal trauma. Latent period is the interval between the time of injury to the time of surgery. 30% of patients were taken for surgery between 11-15 hours and 16% of patients between 6-10 hours of injury. This time lag was due to the site of accidents, which were usually in rural area and the time taken to transport them to the hospital.

2 patients (4%) were taken for surgery after 5 days of injury as they were initially put on conservative management. Since their condition deteriorated on repeated clinical examinations, they had to be taken up for delayed exploratory laparotomy. Associated extra abdominal injuries were found in 29 cases (48%). The common extra abdominal injuries were extremity fractures, pelvic fractures, head injuries and chest injuries including rib fractures. Out of total 60 cases, Plain x-ray of abdomen was done in 55 cases, Gas Under diaphragm was found in 16 cases out of 21 bowel perforations detected at laparotomy. So the sensitivity of plain x-ray abdomen in detecting the pneumoperitoneum was 76% in the present study. In the study by Davis et al⁵ pneumoperitoneum was detected in 6% of cases and dilated bowel loops in 6% of cases. In the present study 69% of patients were subjected for four quadrant aspiration as against 44% in the study by Davis et al⁵. 27 cases were found to be positive and 14 cases were negative for blood. Therefore the sensitivity of this investigation in the present study was 90%. A total of 33 patients were subjected for ultrasound examination, out of which 26 patients had scan detected solid organ injuries for which they underwent laparotomy and found to have significant injuries. Seven patients had scan detected normal solid organs with free fluid and found to have hollow viscus injury at laparotomy. Therefore ultrasound is more reliable in detecting solid organ injuries and free fluid in the abdomen. In study by Yoshi H et al the sensitivity of ultrasound in detecting injuries in blunt abdominal trauma patients was about 94.6%. Small bowel was involved in 27% of cases, followed by spleen (25%), and followed by liver (22%). In Michael L Nance et al¹⁰ study, 1.9% of kidney injuries, 9% of liver injuries, 26.2% of pancreatic injuries and 7.9% of splenic injuries had associated hollow viscus injuries. In the present study closure of bowel perforation was done in 15 patients, colostomy in 2 patients, repair of mesentery in 2 patients, splenectomy in 10 patients, splenorraphy in 3 patients, hepatorrhaphy in 6 patients and resection and anastomosis in 2 patients. A total of nine patients died in the present study. Six patients belonged to operative group and died in the post operative period, majority of them was due to peritonitis and septicemia. One patient died before surgery due to severe head injury. Therefore the mortality in the present study was 15%. This was comparable with other studies published in our country (Khanna et al⁶). The mortality rate in the study by Davis et al⁵ was 13.3%. In the study by Di Vincenti et al¹⁰ (1968) was 23%. Cox et al⁸ study reports a mortality rate of 10%.

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