www.jmscr.igmpublication.org Impact Factor 3.79
ISSN (e)-2347-176x

IGM Publication Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

A Prospective Study of Blunt Abdominal Trauma in a Tertiary Care Center of Northern India

Authors

Mumtazdin Wani[1], Muddassir Shahdhar[2], Shabir Ahmad Mir[3], Iqbal Rasool[4], Bilal Yousuf Mir[3], Hakim Adil Moheen[5]

[1]Professor, Department of Surgery, Govt. Medical College Srinagar
[2]Senior Resident, Department of Surgery, Govt Medical College Srinagar
[3]Post Graduate Scholar, Department of Surgery, Govt Medical College Srinagar
[4]Mch Scholar, Sheri Kashmir Institute of Medical Sciences, Srinagar
[5]Postgraduate Student, BS, SSM College, Srinagar

Correspondence Author
Dr. Shabir Ahmad Mir
Postgraduate, Department of Surgery, Govt. Medical College, Srinagar
Email: *drshabirmir@gmail.com*

Abstract

Background: *The Present study was conducted in the background of increasing abdominal trauma throughout the world and the similar trend in Indian administrated Kashmir. Now a day there is increasing trend towards the non-operative management for the blunt trauma of abdomen.*

Introduction: *Trauma, the most common cause of death for all individuals between the ages of 1 and 44 years, is the third most common cause of death regardless of age. Trauma is estimated to account for 11% of global burden of diseases as measured by the number of disability – adjusted life years experienced by the world's population*

Aims: *The aim of the study was to find out the magnitude and to assess various management options available in dealing with blunt abdominal trauma.*

Methods*: The present study, a prospective analytical one, was conducted in the department of general surgery at SMHS hospital (a tertiary care hospital in the heart of Srinagar City with bed strength of 700 beds) over a period of 17 months (from May 2012 to September 2013). A quota sample of 200 patients with blunt trauma abdomen who were admitted in this department both on routine and emergency basis were randomly selected for the study.*

Results: *Blunt Abdominal Trauma were mainly due to Road Traffic Accidents (41%) followed by fall from heights (36%) and other causes accounted only for (23%) cases. The mean age of the patients was 23.7 years. 111 (55.5%) were managed conservatively requiring only observation and these were the patients with no intraabdominal injury, and 20 cases (10%) were managed non-operatively but with strict protocol. After emergency resuscitation, 69 patients were subjected to exploratory laparotomy.*

Conclusion: *In short proper history, repeated thorough clinical examination, high index of suspicion and the full utilization of preclinical investigative aids are of immense importance in the diagnosis of intraabdominal visceral injuries following blunt trauma abdomen. Emphasis is laid on the importance of carefully prearranged plan for emergency care, diagnosis, proper management of injured patients and on the value of well trained team for the care of patients with blunt abdominal trauma. It is increasingly incumbent on health care providers to ensure that treatments delivered to patients are the most efficient and effective possible. Majority of patients can be managed conservatively. All patients with injuries to solid organs of the abdomen and who are hemodynamically stable should be considered candidates for Non-operative management after their injuries have been staged by abdominal CT Scan but because the CT stage of the injury does not always predict which patients require laparotomy, these patients must remain under the care of experienced trauma surgeons who can not only recognize the presence of an associated hollow viscus injury in need of repair but also will be readily available to operate if the Non-operative approach fails. We believe, even in this initial effort to access outcomes that Non-operative management of solid viscus organs leads to favourable results.*

Key Words: *Blunt Trauma,Abdomen, Non Operative Management, Recustation.*

INTRODUCTION

Trauma, the most common cause of death for all individuals between the ages of 1 and 44 years, is the third most common cause of death regardless of age[1].Trauma is estimated to account for 11% of global burden of diseases as measured by the number of disability – adjusted life years experienced by the world's population[2]. A study of abdominal trauma from eastern Indian metropolitan city showed that trauma mostly involved males (87.3%) between the age of 21 and 30 years, and the most common type of trauma (73.5%) was blunt abdominal trauma[3]. Industrial development, mechanized traffic, increased crime and weapons of mass destruction have increased the incidence and complexity of trauma.

Abdomen is the most commonly injured region with injuries requiring surgery in about 20% of civilian trauma victims.[4] Blunt trauma continues to be the most common mechanism of injury to the abdomen. Blunt trauma injuries result from a combination of crushing, deforming, stretching and shearing forces. The injuries produced are a constellation of contusions, abrasions, fractures and tissue and organ rupture. Blunt abdominal Trauma usually results from vehicle collisions, assaults, recreational accidents, or falls. The most commonly injured organs are the spleen, liver, retroperitoneum, small bowel, kidneys, bladder, colorectum, diaphragm and pancreas[5]. Vehicular trauma is by far the most common cause of blunt abdomen trauma in civilian population. Auto-to-auto and auto-to-pedestrian collision have been cited as the cause in 50 – 75% of cases[6]. According to national and international data, male to female ratio is 60:40[7]. Most studies indicate that the peak incidence occurs in persons between the ages of 14 - 30 years [1].

In order for the critically injured patient to have the best chance of survival, the victim must receive high quality care from the earliest post injury moment through the rehabilitation phase. Best utilized scheme in the initial care of the trauma care is by following the Advanced Trauma Life Support [ATLS] guidelines.

Non operative management of children with blunt splenic injury has been practiced by paediatric surgeons since 1960. Non operative management is now being extended to patients of all ages with blunt trauma to solid viscera and to selected patients with stab wounds.

The recent trend is heavily in favor of non-operative or conservative surgical management of blunt abdominal trauma. The shift from routine operative to selective non-operative management of blunt injuries to abdominal solid organs is one of the most notable trend in the case of trauma pients during the past two decades[8,9]

Aim of the study:

The aim of the study was to find out the magnitude and to assess various management options available in dealing with blunt abdominal trauma.

Patients & Methods

The present study, a prospective analytical one, was conducted in the department of general surgery at SMHS hospital (a tertiary care hospital in the heart of Srinagar City with bed strength of 700 beds) over a period of 17 months (from May 2012 to September 2013). The study of the patients started from the emergency department which is well equipped with resuscitation facilities, radio imaging unit, emergency laboratory and 24 hour operation theatre availability.

A quota sample of 200 patients with blunt trauma abdomen who were admitted in this department both on routine and emergency basis were randomly selected for the study. Total no. of patients with traumatic injuries presented during the study period was 1100. About 75%of these (1100 patients) presented with blunt abdominal trauma of which 76% were excluded from the study. The study was done over a period of 17 months, from May 2012 to September 2013.Data was collected on site. All age groups and both sexes were included. However, following patients were excluded from this study:

1. Patients of polytrauma including head, spinal, thoracic and cardiovascular injuries.

2. Patients having combined blunt and penetrating trauma.

3. Pregnant Women.

4. Those patient who were dead before primary medical intervention.

5. Patients referred elsewhere.

Sensitivity and specificity was calculated as:

Sensitivity = true positive /true positive +false negative and

Specificity = true negative/true negative+ false positive

RESULTS

Blunt Abdominal Trauma were mainly due to Road Traffic Accidents (41%) followed by fall from heights (36%) and other causes accounted only for (23%) cases

F.A.S.T:

Three patients were immediately operated without any investigations.

Table I: Focused Assessment by Sonography for Trauma(n=197)

Patients	Only Free Fluid	Only Organ Injury	Both Organ Injury And Free Fluid	False Negative
Number	58	28	47	11
Percentage	29.44	14.21	23.8	9.9

Specificity= 100% (True negative/true negative+ false positive)

True Negative = 53

False positive = 0

Sensitivity = 92.36% (True positive /true positive + false negative)

True positive = 58+28+47=133

False negative = 11

Table II: Vital signs in patients of blunt abdominal trauma.(n=200)

Vital signs	No. of patients with		
PULSE (per minute)	Tachycardia (>100)	Normal (60-100)	Bradycardia (< 60)
	84	106	10
BLOOD PRESSURE (mm Hg)	Hypertension (Sys - >140)	Normal (90- 140)	Hypotention (< 90)
	15	139	46
TEMPERATURE (oC)	Hyperthermia (> 37.4)	Normal (36-37.4)	Hypothermia (< 36)
	32	161	07
RESPIRATORY RATE (per minute)	Tachypnea (> 16)	Normal (12-16)	Bradypnea (< 12)
	56	142	2

Table III: Overall spectrum of Solid Visceral Injury from blunt abdominal trauma (n=52)

Solid Viscus Involved	INJURY					MANAGEMENT		TOTAL	
	Grade I	Grade II	Grade III	Grade IV	Grade V / VI	Non-operative	Operative	No.	%age
SPLEEN	3	4	9	8	2	4	22	26	50
LIVER	4	6	8	1	0	6	13	19	36.54
KIDNEY	1	3	0	1	1	4	02	06	11.54%
PANCREAS	0	1	0	0	0	0	01	01	01.92%
TOTAL	8	14	17	10	03	14(27%)	38(73%)	52	100%

Table IV: Operative procedures: (n=69).

ORGAN	OPERATIVE PROCEDURES	No. OF CASES	PERCENTAGE	TOTAL %AGE
Spleen (n = 26)	Non-operatively	4	15.4	20.0
	Spleenectomy	22	84.6	31.88
	Splenoraphy	0	0	0
Liver (n = 19)	Non-operatively	6	31.57	30.0
	Repair	8	41.11	11.60
	Augmented Repair	2	10.53	2.90
	Resection and selective hepatic Arty legation.	1	05.26	1.45
	Gauze packing partial repair	2	10.53	2.90
Kidneys (n = 6)	Non-operative	4	66.66	20
	Repair	1	16.67	1.45
	Partial Nephrectomy	0	0	0

	Nephrectomy	1	16.67	1.45
Pancreas (n = 1)	Non-operative	0	0	0
	Repair	1	100	1.45
Stomach (n = 2)	Primary Closure	2	100	2.90
Duodenum (n = 2)	Primary repair with omental patch	2	100	2.90
Ileum (n = 8)	Primary repair	7	87.5	10.14
	Resection and anastomosis	1	12.5	1.45
Jejunum (n = 6)	Primary repair	5	83.33	7.24
	Resection and anastomosis	1	16.67	1.45
Colon (n = 1)	Primary repair	1	100	1.45
Diaphragm (n = 2)	Repair	2	100	2.90
Mesentery (n = 5)	Non-operative	2	40	10
	Primary repair	2	40	2.90
	Repair with bowel anastomosis	1	20	1.45
Retroperitoneal Haematoma (n = 4)	Non-operative	4	100	20
	Operative	0	0	0
Urinary Bladder (n = 6)	Intra peritoneal closure with Extraperitoneal supra pubic cystotomy	2	33.34	2.90
	Extraperitoneal closure with supra pubic cystotomy	4	6.66	5.80

MORTALITY:

Six patients (3%) died out of the 200 cases of blunt abdominal trauma.

One patient (0.5%) in Non operative group

Five patients (2.5%) in Operative group.

Table V: D.P.C in blunt abdominal trauma (n=200)

Patients	Positive	True Positive	False Positive	False Negative
Number	68	65	3	8

DISCUSSION

INCIDENCE: In our hospital the incidence of blunt abdominal injury was 3% during the period of study. Total number of patients admitted in surgical causality during the study period was 27596 of whom 828 had blunt abdominal trauma. Incidence observed here in is slightly lower than that of west[10], where the life is more mechanized.

AGE DISTRIBUTION: The age of the 200 patients in the present study ranged from 3 years to 70 years with a mean age of 23.7 years. Maximum patients were in the age group of 21 – 30 years (30%) followed by the age group of 16 – 20 years (27%), children below age of 15 years(18%), age group 31 – 40 years (15%) and age group of 61 – 70 years(2%). This indicates that young adults are more prone to abdominal trauma probably because of the more exposure to day to day hazards of life and mercurial temperament. The youngest patient of the series was 3 years old while the oldest was 70 years This indicates that although young adults are more prone to abdominal trauma but all age can undergo trauma. Similar rate incidence had been reported by Everard (1983)[11] in a five year study of 870 patients of blunt trauma.

SEX DISTRIBUTION: Trauma abdomen was observed in both sexes with 4.5: 1 male to female ratio.

LAB INVESTIGATIONS: Blood profile showed that TLC counts were normal in 44.5% of cases, Leucocytosis (TLC more than 11000/mm^3) was present in 89 cases. Although an elevated leukocyte count may suggest an abdominal injury especially a hallow organ however any conclusion about the type or presence of an intraabdominal lesion is dangerous. Taylor (1977)[12] have also reported that leucocytosis is extremely variable in blunt trauma abdomen.

RADIOGRAPHY: Plain radiographs of the abdomen were taken in all cases and were having one or other positive findings in 42 cases (21%), however accuracy depended mainly on the organ injured. In case of perforated viscus the accuracy went up to 68%.Our observation of low percentage positivity corroborated well with Taylor (1977)[12]33%, Romesh (1983)[13]33%.

USG: Focused Assessment by Sonography for Trauma (FAST) was done in 197 patients, just after resuscitation. Free intraperitoneal fluid was picked in 29.44% cases, organ injury without free fluid in peritoneal cavity was observed in 14.2% cases and both organ injury and free fluid was

observed in 23.8%of cases. Time taken for FAST averaged about 2.3 ± 1.3 minutes. On comparing FAST findings with DPC, DPL, CT-scan and operative findings of patients, overall sensitivity and specificity were 87.64% and 93.9% respectively.Mc Kenny *et al* (1994)[14]showed sensitivity of 83%, specificity of 100% and suggested that FAST may replace DPL

CT SCAN: Computed tomography (CT) scan, a standard criterion among the diagnostic aids, was done in 60 patients (30%). It revealed free fluid and organ injury or either of the two in 58 patients and revealed no abnormality in two patients suffering with hematuria. CT scan refined the FAST finding in 46 (23.3%) out of 197 cases in whom FAST was done. CT scanning in 11 cases (18.3%) picked up injuries when USG was negative for those finding, with no false positive cases. The findings also corroborated well with laparotomy findings. This investigation was used to grade the injury of the patients who were to undergo non-operative management of intra abdominal injuries following blunt abdominal trauma. In our series CT scan was not the routine investigation; it assisted in defining treatment and occasionally allowed to foretell the outcome. Kailidou *et al* (2005)[15] in their evaluation of blunt abdominal trauma also used CT scan to assist in defining treatment. Amoroso (1999)[16] in describing an evidence based approach for evaluation of the patient with blunt abdominal trauma considered CT scan as the current standard of care.

DIAGNOSTIC PARACENTESIS (D.P.C): Four quadrant technique of needle aspiration was adopted in all patients of blunt trauma abdomen and it was observed to be true positive in 65 cases and true negative in 124 cases with a sensitivity of 89.04% and specificity of 97.63%.

Similar results have been reported by Giacobine and Siler (1960)[17]

DIAGNOSTIC PERITONEAL LAVAGE (D.P.L):D.P.L. was done in 6 cases in this study as their X-rays, U.S.G. and peritoneal tap results were normal but there was a high clinical suspicion of intra abdominal organ injury. It was positive in one case and negative in rest of 5 cases. It has an accuracy of 100%. Taylor (1977)[12] has stated that a negative result after diagnostic peritoneal lavage indicates that there is no serious injury in the peritoneal cavity.

MANAGEMENT:

I. CONSERVATIVE:

In this series of 200 patients 111 (55.5%) were managed conservatively and these were the patients with no intraabdominal injury. However, these patients required an observation for about 24 – 72 hours and most of these were discharged within 48 hours of admission. The percentage cases that required conservative management in our study is considerable lower than similar type of cases reported in literature. The low percentage cases requiring conservative management in our series may be attributed to retainment of

such cases at satellite hospitals and referring of more serious cases to SMHS Hospital (a tertiary hospital where study was conducted). As per international data 80% - 85% of patients with clinical suspicion of blunt abdominal trauma are managed conservatively[1].

II. NON-OPERATIVE MANAGEMENT:

This management plan was adopted in intra abdominal organ injuries cases. This management plan was used only for solid organ injuries cases. The shift from routine operative to selective non-operative management (NOM) of blunt injuries to abdominal solid organs is one of the most notable trends in the case of trauma patients. Physicians are becoming increasingly comfortable in managing such injuries non-operatively. In present series over all 20 cases (10%) were managed non-operatively. 14 patients (30%) out of 52 patients having solid viscus injury were managed non-operatively. 4(15.4%) cases out of 26 splenic injury, 6 cases (31.5%) out of 19 liver injury, 4 cases (66.66%) out of 6 renal injuries were managed non operatively. Follow up imaging was performed 3-5 days after injury and if evidence of healing was present non-operative therapy was continued. Patients were instructed to avoid physical straining for a minimum of three months. Compliance and follow up was good and nearly 75% of patients returned for follow up imaging after three months

Non–operative management of splenic injury (15.4%) in our series is quite low as compared to 70% reported by Velmahos *et al* (2000)[19].

Non-operative line of management of liver injury in our series has been low 31.5% as compared to international standard[1] of 80%.Almost three-fourths of SVI encountered at laparotomy were of grade I-III and isolated, which could have been managed non-operatively at well-equipped trauma centers. However guarded initial experience at our institution prompted us to tread cautiously and opt for laparotomy in case of doubt “when in doubt it is better to open and see than to wait and watch”-Grey Turner or this may be due to the initial phase of this management trend in our case. The management of blunt liver injuries in adult has changed with time. This changing trend has been very well documented by Richardson *et al* (2000)[8] in their own institution over a 25 year period. Out of all 24 cases put on non-operative line of treatment, four cases (three splenic and one liver injury) required invasive surgical intervention, the compelling reason for change over to invasive surgical treatment was continuous internal bleeding which was evidenced with a decrease in the systolic B.P. to less than 90mm Hg. despite of adequate resuscitation, need for more than four units of blood to maintain a hemoglobin level higher than 100gm per liter (10gm/dl.) and the development of peritoneal signs or evidence of

intra abdominal hypertension (bladder pressure greater than 20cm of water).

III. OPERATIVE MANAGEMENT:

After emergency resuscitation, 69 patients were subjected to exploratory laparotomy. During laparotomy thorough examination of all viscera and gut was ensured. Hemorrhage was controlled and proper operative procedures were carried out.

- FINDINGS:

Intra Abdominal Injuries:

In our series of 200 patients of non-penetrating injuries 89 patients (44.5%) had intra abdominal injuries. Splenic injury remained still the commonest finding 29.21% and was seen in 26 out of 89 cases. Other frequently injured organ was liver in 21.34% followed by Ileum 08.98%. Jejunum, Kidney and Urinary bladder each in 6 cases (06.74% each), mesentery 5 cases (05.6%), retroperitoneal haematoma 4 cases (04.4%), stomach, duodenum and diaphragm each 2 cases (02.24% each), pancreas and colon 1 each (01.11%). Table: XXIV.

Fitzgerald *et al* (1960)[20] analyzed a series of 200 patients with blunt trauma abdomen and reported that liver injury accounted for 105 (52.5%) followed by spleen in 93(46.5%) small bowel in 18 (9%), diaphragm in 16 (8%), colon in 10 (5%), kidney in 9 (4.5%), bladder in 8 (4%), stomach, pancreas, omentum, renal artery, IVC in two (1%) each. Gallbladder damage in 1 case (0.5%)

OPERATIVE PROCEDURE:

Operative management of blunt abdominal injury has been the purview of the general surgeons since the early 20th century. The critical decision in the case of patients who sustain serious blunt abdominal injuries is whether to proceed with surgery or not. Delays or errors in judgment can result in serious patient morbidity or even mortality. In the present series 50.8% of patients were explored within first 12 hours, 26% within next 12 hours and 23.2% after 24 hours of the injury. The reason for delayed operations was either late reporting at the hospital or delayed appearance of signs and symptoms due to delayed occurrence of perforation or when the size of perforation was very small or temporary sealing of the gut perforation.

Splenic injury (n=26) was invariably treated with splenectomy (22 out of 26 patients). In none of the patients' splenorraphy, procedures like angiographic splenic artery embolization, splenic auto transplantation or splenic artery ligation alone were carried out.

Liver injury (n=19) was managed according to grade of injury. Electrocautry and surgical pack were the most common haemostatic methods employed. Simple repair was done in 8 cases (11.60%), augmented repair with omentum or gel foam was done in 2 cases(2.90%). Resection and selective hepatic artery ligation was done in one case (1.45%) and simple gauze packing was done in two cases (2.90%).

Kidney (n=06) - repair was done in one, nephrectomy in one, however, 66.66% were managed Non-operatively.

Pancreatic injury (n=1) was repaired, it was a combined injury along with splenic and left renal injury.

Two patients (2.90%) underwent primary repair of their stomach injury.

Small perforations of small intestine were closed and large perforations needed Resection and end to end anastomosis. Primary repairs were performed, 2 in duodenum (n=2); 7 in ileum (n=8); 5 in jejunum (n=6); resection anastomosis was done one each for ileum and duodenum. Colonic injury (n=1) was observed in one case and where in transverse colon was repaired.

Mesenteric injury (n=5) were managed with primary repair in two cases and repair with bowel anastomosis in one case. Two injuries were managed non-operatively.

Urinary bladder injuries (n=6) were mainly managed by extra peritoneal closure with SPC in four cases and two cases were treated by intraperitoneal closure with SPC.

Diaphragmatic injury (n=2) was repaired primarily.

Negative laparotomy (laparotomy with the finding of no internal organ damage) was performed in none.

Lowe *et al* (1971)[20] in their study of 1513 patients with abdominal trauma found an incidence of 16.19% of negative laparotomies. 178 had complete negative finding and 67 were judged to have only visceral injuries which do not require any surgical repair. Our study observed no negative laparotomy. This was due to excellent preoperative diagnostic workup. Mohopatra (2003)[21] reported 1.4% the incidence of negative laparotomies.

HOSPITAL AND I.C.U. STAY:

In our series, conservatively treated patients were discharged within range of 1-3days, Non-operative group had a hospital stay of average duration of 7-10days and Operative group of about 5-12 days. None of the conservatively managed patients (n=111) needed I.C.U admission, two cases (10%) of Non-operative group(n=20) and six cases(8.7%) of operative group(n=69) required post operative I.C.U admission. As per Mohopatra *et al* (2003)[22] the average duration of hospital stay was 7.8 days for the non operative group and 10.4 days for the operative group. None of the patients were kept in ICU.

CONCLUSIONS

The conclusions drawn are summarized as:

- The incidence of a blunt trauma has attained a gradual rising trend. Our incidence in present study was 3%.
- 124 patients (62%) had urban origin while 76 patients (38%) were from rural area. Patients from Srinagar headed the

list 62% followed by Baramulla 11.5% and Budgam 2.5%.

- Trauma abdomen was mainly observed in young age of second and third decade and the average age of all patients was 23.7 years.
- Male predominated over females and male to female ratio was 4.5: 1.
- Road Traffic Accidents were the most common cause 41% of affliction followed by fall from heights 36% and physical assault 12%.
- 80% of patients reported casualty within 12 hours after trauma. However, only 11.5% of patients were received in the golden hour of trauma management.
- Pain (90.5%) was the predominant symptom in conscious alert patients, followed by vomiting (15.5%).
- Abdominal tenderness (44%), followed by pallor (29%), rigidity (24%) and shock was present in 23% of patients.
- Routine investigations like Hb and TLC varied. Thirty-one percent of patients had Hb>10gm/dl. 8.5% of patients had Hb<6gm/dl. Similarly leukocyte count varied between less than 5000/mm^3 in 11% and greater than 11000/mm^3 in 44.5% of patients.
- Radiography, as plain X-ray of abdomen was helpful in a small percentage of cases (21%) and was with some element of ambiguity to rule out any intra abdominal injury.
- FAST "the emerging standard" a quick and non invasive investigation was done in 98.5% of patients and only 11 (9.9%) were with false negative results. The specificity of the test was 93.9%. Secondary ultrasonography investigation after 24 hours oadmission almost ruled out any intraabdominal injury.
- CT scan "the standard criterion" was performed in selected patients (30%). It refined the sonographic finding in 23.3% of patients and picked up intra abdominal injuries in 18.3% (11 cases) which FAST did not detected.
- D.P.C. was observed to be highly diagnostic. However false negative results were 06.06%, with the sensitivity of 89.04%, hence forth negative DPC cannot rule out injury.
- D.P.L. was 100% sensitive to detect any intra abdominal injury. However, as being an invasive procedure, it was used only in 6 patients (3%) where other investigations were normal but an element of clinical suspicion was there.
- Out of 200 patients admitted with suspicion of Blunt Abdominal Trauma only 89 patients (44.5%) had intraabdominal injury present. Out of the intra abdominal injury cases 76.4% injuries were isolated and rest 23.6% were combined.
- Spleen was the most commonly injured organ. It was injured in 29.21% cases followed by liver 21.34% cases, Ileum

8.98% cases. Jejunum, Kidney and Urinary Bladder shared the same incidence of 6.74% cases. Pancreas was involved in 01.11%cases.

- Extra abdominal injuries were quite commonly associated with blunt abdominal trauma. Among the associated injuries soft tissue injuries headed the list followed by rib, extremities and head fracture.
- 111 patients (55.5%) were managed conservatively and were observed and discharged after an average Hospital stay of 1-3 days.
- Ten percent of patients were managed Non-operatively. 30% of patients (14 cases) out of 52 patients with solid viscus injury were managed Non-operatively. This plan of management was quite successful in liver and Kidney with overall success rate of 40%.
- Sixty-nine patients (34.5%) were managed operatively and 76.8% of the cases were operated within 24 hours of admission. Splenectomy (31.88%) was the commonest operation done. Liver injuries (21.34% cases) were mainly managed by repair (52%) simple or augmented. Nephrectomy was done in one patient only 1.45%. Hollow viscus injuries were mainly managed by primary repair.
- Re-exploration was done in only one patient 1.45%. It was for postoperative complication of enterocutaneous fistula.
- Wound sepsis was the commonest local complication 10.14%, whereas UTI predominated 11% among the general complications followed by pulmonary ones. Development of septicemia, DIC, ARDS were detrimental for survival.
- The average hospital stay was 9-10 days. It was 1.-3 days for conservative, 7-10 days for operative and 5-12 days for Non-operative management. Complication and multiple organ injuries prolonged the hospital stay.
- Only 8 patients (4%) required admission in surgical intensive care unit. None of patients managed conservatively were admitted in S.I.C.U. Two cases (10%) of Non-operative management and six cases (8.7%) of Operative management were managed in S.I.C.U.
- The overall mortality rate in this series was (3%), with 0.5% in Non-operative group and 2.5% in Operative group.
- Factors influencing mortality were:
  - Multiple injuries.
  - Irreversible Shock.
  - Extremes of age.
  - Therapeutic delay.
  - Septicemia.

In short proper history, repeated thorough clinical examination, high index of suspicion and the full utilization of preclinical investigative aids are of immense importance in the diagnosis of intraabdominal visceral injuries following blunt trauma abdomen.

Emphasis is laid on the importance of carefully prearranged plan for emergency care, diagnosis, proper management of injured patients and on the value of well trained team for the care of patients with blunt abdominal trauma. It is increasingly incumbent on health care providers to ensure that treatments delivered to patients are the most efficient and effective possible. Majority of patients can be managed conservatively. All patients with injuries to solid organs of the abdomen and who are hemodynamically stable should be considered candidates for Non-operative management after their injuries have been staged by abdominal CT Scan but because the CT stage of the injury does not always predict which patients require laparotomy, these patients must remain under the care of experienced trauma surgeons who can not only recognize the presence of an associated hollow viscus injury in need of repair but also will be readily available to operate if the Non-operative approach fails. We believe, even in this initial effort to access outcomes that Non-operative management of solid viscus organs leads to favorable results.

MORTALITY:

In our study total mortality was 3%, out of which 0.5% was in non-operative group and 2.5% in operative group. This is much less in comparison as mentioned by:

Divincenti *et al* (1968)[99] 18%

Davis et *al* (1975)[75] 13.3%.

REFRENCES

1. Shires G.T: Principles of trauma. Care New York, 1985Source: Principles of surgery by Schwartz Shires and spencer6th edition-1994Vol. I: 175-227.
2. Mackenzie EJ, Steinwachs DM, Shankar B, Classifying trauma severity based on hospital discharge diagnosis. Med Care 1989, 27; 412.
3. Ghosh HYPERLINK "http://www.ncbi.nlm.nih.gov/pubmed?term=Ghosh%20P%5BAuthor%5D& cauthor=true&cauthor_uid=21888154" P, Halder SK, Paira SK, Mukherjee R, Kumar SK, Mukherjee SK.: An epidemiological analysis of patients with abdominal trauma in an eastern Indian metropolitan city. J Indian Med Assoc. 2011 Jan;109(1):19-23.
4. Cogbill T.H., Moore E.E and Jurkovich G.J et al; Severe hepatic trauma: A multi-centric experience with 1,335 liver injuries. J.Trauma. 1988, Vol. 28, No.10:1433-1438.
5. Edino ST; Pattern of abdominal injuries in Aminu Kano Teaching Hospital, Kano: Niger postgrad Med J 2003 Mar; 10(1): 56-9.

6. 0bekpa PO, Ugwu BT, Kidmas AT, Momoh JT, Edino S, Igun G; Experience in managing splenic trauma on the jos plateau. West Afr J Med 1997 jul- sep; 16(3) : 150-6
7. Madzhov R, Arnoudov P; Diagnostic and therapeutic strategy by patients with abdominal and thoracoabdominal traumas. Khirurgiia (Sofia) 2001; 57(5-6):14-8.
8. Richardson JD, Franklin GA, Lukan JK et al Evolution in the management of hepatic trauma: a 25 year prospective. Ann Surg 2000, 232; 324-330
9. Pachter HL, AA Guth, SR Hofstatter Changing patterns in the management of splenic trauma: the impact of Non-operative management. Ann Surg 1998 May; 227(5) 708-719
10. David B.Hoyt, Roul Coimbra, Bruce Potenza; Management of acute trauma, Sabeston Textbook of surgery, Townsend, Beauchamp, Evers and Mattox 17th /e WB Saunders Philadelphi 2004 p483-551.
11. Everard F. Cox. M.D, F.A.C.S A 5-year analysis of 870 patients requiring celitomy. Ann. Surg. 1983Vol. 199. No.4:467-474.
12. Taylor Bryce Newer aids in the diagnosis of blunt abdominal trauma Ann .Surg 1977,116;4
13. Ramesh and M.S. Malik Evaluation and treatment of intestinal disruption following blunt abdominal trauma Thesis University of Kashmir, 1983
14. Mc. Kenney M, Lentz K, Nunez D et al; Can ultra sound replace diagnostic peritoneal lavage in the assessment of blunt trauma. J Trauma 1995 Aug 39 (2) 393-5.
15. Kailidou E, Paroles E, Katsiva V, Karavokyros IG, Athanassopoulou A Papakostantinou I, Leppaniemi A, Bramis I, Tibishrani M. Contrast- enhanced spiral CT evaluation of blunt abdominal trauma. JBR-BTR.2005 May-Apr; 88(2): 61-5.
16. Amoroso TA. Evaluation of the patients with blunt abdominal trauma: an evidence based approach Emerg Med Clin North Am. 1999 Feb;17 (1):63-67
17. Giacobine J.W, Siler V.E: Evaluation of diagnostic abdominal paracentesis with experimental and clinical studies. Surg Gynecol Obstet. 110:676. 1960.
18. elmahos G.C., Linda S Chan et al; Non-operative management of splenic injuries. Have we gone too far. Arch Surg 2000, 135; 674-681
19. Fitzgerald J.B, Crawford E.S and DeBakey M. E: Surgical considerations of non-penetrating abdominal injuries. Amer. J. Surg 1960 :100:22-29 .
20. Lowe RJ., Boyd D.R., Frank C.M et al; The negative laparotomy for abdominal trauma. J. Trauma. Vol. 12, No.10: 853-861, 1971.
21. Bouwman D.L, Weaver D.W and Walt A.J.: Serum Amylase and its isoenzymes: A clarification of their implications in

trauma. J.Trauma.1984 Vol. 24, No.7:573-578

22. Mohapatra Srikant,Pattanayak Siba Prasad, Rao K. Raja Mohan Options in the management of solid visceral injuries from blunt abdominal trauma Indian Jr. of Surg 2003 Vol 65, No.3,Page :263-268.