

CLINICAL STUDY AND MANAGEMENT OF BLUNT INJURY ABDOMEN PERTAINING TO SOLID ORGANSKatta Srinivasa Rao¹, D. Gopikrishna², Md. Aslam³, G. Subba Rao⁴**HOW TO CITE THIS ARTICLE:**

Katta Srinivasa Rao, D. Gopikrishna, Md. Aslam, G. Subba Rao. "Clinical Study and Management of Blunt Injury Abdomen Pertaining to Solid Organs". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 79, October 01; Page: 13768-13776, DOI: 10.14260/jemds/2015/1965

ABSTRACT: Blunt Abdominal trauma is one of the most common causes among injuries caused mainly due to road traffic accidents.¹ The rapid increase in number of 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.² Blunt injury of abdomen is also a result of fall from height, assault with blunt objects, industrial mishaps, sport injuries, bomb blast and fall from riding bicycle.² In view of increasing number of vehicles and consequently road traffic accidents, this topic is chosen to study the cases of blunt abdominal trauma with reference to the patients presenting at Govt. General Hospital, attached to Guntur Medical College, Guntur. **OBJECTIVES:** The objectives of the study are: 1. To evaluate the impact of blunt abdominal trauma on solid viscera. 2. To evaluate etiology and various modes of presentation. 3. To evaluate various available investigations for the detection of solid organ injuries. 4. To evaluate various modalities of treatment available with aim to reduce the mortality and morbidity. 5. To evaluate common complications of solid organ injury in blunt trauma abdomen. **MATERIALS AND METHODS:** Patients admitted in Government General Hospital, Guntur, from November 2012 to October 2014 and studied 50 cases. This is a prospective study conducted over 2 years. **RESULTS:** Male patients were commonly affected (80%), Peak age group being 21-30 years (48%). The commonest mode of injury was road traffic accident (58%). The common organ injured was spleen (54%) followed by liver. 70% of the patients were treated by surgery, 30% conservatively. The mortality in this study was 14%. **CONCLUSIONS:** Blunt injury abdomen forms considerable load and health care system, most common age group is youngsters in road traffic accidents, so efforts should be made to formulate and execute road traffic regulations. Well established trauma care centers should be established. High index of suspicion and prompt management reduces the mortality and morbidity.

KEYWORDS: Blunt abdominal trauma; Solid organs; Road traffic accidents; Splenic injury.

INTRODUCTION: Blunt abdominal trauma is usually not obvious. Hence, often missed, unless, repeatedly looked for. Several pathophysiological processes take place in case of blunt injury abdomen. In general injuries are classified as high energy or low energy.^{2,3,4} Focussed assessment sonography for trauma has emerged as a useful diagnostic test in the evaluation of blunt injury abdomen.^{5,6,7} There are four categories of injuries depending on the seriousness of injury.⁸ Exigent, emergency, urgent, deferrable. Thorough investigation, timely treatment saves many victims of abdominal trauma.

METHODS OF COLLECTION OF DATA: Direct interview with the patient or patient relatives accompanying the patient and obtaining a detailed history. Thorough clinical examination. Clinical findings and relevant diagnostic investigations performed over the patient.

ORIGINAL ARTICLE

After initial resuscitation of the patients, thorough assessments for injuries were carried out in all the patients. Documentation of patients, which included, identification, history, clinical findings, diagnostic test, operative findings, operative procedures, complications during the stay in the hospital and during subsequent follow-up period, were all recorded on a Proforma specially prepared. Demographic data collected included the age, sex, occupation and nature and time of accident leading to the injury.

After initial resuscitation and hemodynamic stability, all patients were subjected to careful examination, depending on the clinical findings; decision was taken for further investigations such as four-quadrant aspiration, x ray abdomen and FAST.

The decision for operative or non-operative management depended on the outcome of the clinical examination, hemodynamic stability and CECT abdomen.

Patients selected for non-operative or conservative management were placed on strict bed rest, were subjected to serial clinical examination which included hourly pulse rate, blood pressure, respiratory rate and repeated examination of abdomen and other systems. Appropriate diagnostic tests especially ultrasound of abdomen was repeated as and when required.

CT scan was done in 36 patients in our study. FAST was done in all patients and results and observations are as follows.

RESULTS: From November 2012 to October 2014, 50 numbers of cases were studied which belonged to surgical units in Government General Hospital, Guntur.

Gender	No. of Patients	Percentage
Male	40	80%
Female	10	20%

A: Sex Incidence

Age Group	No. of Patients	Percentage %
11-20	2	4
21-30	24	48
31-40	14	28
41-50	4	8
51-60	4	8
61-70	1	2
71-80	1	2

B: Age Incidence

In this study majority belongs to 21-30 years of age accounting for 48% followed by 31-40 years of age.

Cause	No. of Cases	Percentage
Road Traffic accident	29	58%
Fall from height	12	24%
Assault / injury with blunt object	9	18%

C: Mode of Injury

ORIGINAL ARTICLE

In 58%cases road traffic was the mode of injury followed by fall from height in 24%. Least was injury with blunt object in 18%

It is the time interval between time of injury to time of presentation to our hospital.

Hours	No. of Cases	Percentage
0-6	15	30%
7-12	20	40%
13-18	8	16%
19-24	4	8%
>24	1	2%
Not known	2	4%

D: Latent Period

40% of cases presented to hospital between 7-12 hours of incident. 1 patient presented after a day.

Investigations: USG abdomen was done in all 50 cases. Organ injury in USG abdomen:

Organ	No. of Patients	Percentage
Spleen	27	54%
Liver	15	30%
Kidney	6	12%
Pancreas	2	4%

E: Ultrasonography of Abdomen

CECT was performed in 36 cases.

Organ Injured	No. of Cases
Spleen	18
Liver	12
Pancreas	2
Renal	4
Not done	14

F: CT scan

Those patients who did not undergo CECT were taken for laparotomy as they were hemodynamically unstable.

Treatment	No. of Patients	Percentage
Conservative	15	30%
Operative	35	70%

G: Ratio of Operative to Conservative Treatment

ORIGINAL ARTICLE

70% (35) of the patients underwent emergency laparotomy because of pneumoperitoneum or hemodynamic instability. 15 patients were managed non-operatively because they had no signs of peritonitis and they were hemodynamically stable.

The below table shows various operative procedures carried out during exploratory laparotomy:

Procedure	No. of Patients	Percentage
Splenectomy	22	62.8%
Hepatorrhaphy	4	11.4%
Spleenorrhaphy	2	5.7%
Perforation closure	2	5.7%
Splenectomy + Perforation closure	3	8.5%
Drainage Procedure for Pancreatic Injury	2	5.7%

H: Type of Surgery

In our study, spleen was the most commonly injured organ.

Organ	No. of Patients	Percentage
Spleen	27	54%
Liver	15	30%
Kidney	6	12%
Bowel injury	5	10%
Pancreas	2	4%

I: Organ wise Injury

Organs injured	No. of Patients
Spleen + hollow viscus	3
Spleen + renal	2
Spleen + liver	2
Renal + hollow viscus	1
Spleen + Liver + renal	1
Liver + pancreas	2

J: Multiple Organs Injured

Majority of the times multiple organs are involved in our study as shown above.

Complications:

Post-op Complications	No. of Patients
Wound infection	3
Respiratory complication	5
Wound dehiscence	1
Intra-abdominal abscess	1

K: Complications in Patients Undergoing Surgery

ORIGINAL ARTICLE

Complications	No. of Patients
Respiratory complication	3
Intra-abdominal abscess	2
L: Complications in Patients Managed Conservatively	

Mortality: Total 7 patients died in the present study. 3 belonged to operative group and died within 2-3days of post-operative period mainly due to hypovolemia or sepsis. 3 patients died during resuscitation. 1 died due to severe head injury. Therefore mortality is 14%.

DISCUSSION:

Gender	Our Series	Davis et al, ⁹
Male	80%	70
Female	20%	30
Sex Incidence		

From the above table it is clear that males are more common victims of blunt trauma abdomen when compared to Davis et al study⁹. The incidence is slightly more in males involved in RTA and Assaults.

Age group - in our study majority of our study population belonged to 21-30yrs of age.

Followed by 31-40yrs of age as young people are involved in RTA which is compared to Daviset al study.⁹

Age group	Our Study	Davis et al ⁹
11-20	4%	19%
21-30	48	24%
31-40	28	15%
41-50	8	13%
51-60	8	6%
61-70	2	3%
71-80	2	-
Age Incidence		

Cause	Our study	Davis et al ⁹	Khanna et al ¹⁰
Road Traffic accident	58%	70%	57%
Fall from height	24%	6%	15%
Assault / injury with blunt object	18%	17%	33%
Mode of Injury			

From above table it clearly states that RTA is the most common mode of injury because of increased number of vehicles recently. The young people also give priority to speed rather than safety.

ORIGINAL ARTICLE

Clinical Presentation: In our series abdominal pain was the most common presenting complaint accounting 90%. Abdominal distention was next most common presentation in 56% of cases. The signs and symptoms are misleading in case of blunt trauma abdomen and are masked by concomitant head injury, chest injury and alcohol consumption. Retroperitoneal organ injury was missed in USG abdomen.

In Davis et al study⁹ 43% had no specific complaints. So this emphasizes the importance of careful and continuing observation and repeated clinical examination of individuals with blunt trauma abdomen.

Latent Period: Latent period is the interval between the times of injury to presentation to our hospital. 40% of our patients presented between 7-12hrs after injury. 30% presented within 6hrs after injury. This time lag is due to lack of facility for transport. Many belonged to rural area.

Associated Injury	Our Study	Davis et al, ⁹	Khanna et al, ¹⁰
Head	12%	9%	12%
Thorax	32%	27%	24%
Extremities #	20%	15%	27%
Pelvis #	6%		
Soft tissue injury	4%	12%	-
No association	26%	-	-
Associated Injuries			

Associated injury was present in 37 cases. The most extra abdominal injury was thoracic accounting for 32% followed by extremity fracture, head injury, pelvic fracture and soft tissue injury in descending order. There was no association in 13 patients. The above table shows comparison to present study.

Haemoglobin: Haemoglobin percentage was done in all cases out of which 26% of our study population had hemoglobin less than 8grams.

Hematocrit: Hematocrit value was done in 45 patients. It was <30% in 40% of our study population. In 5 cases there was decreasing hematocrit on serial measurement and were taken for emergency laparotomy.

Urine microscopy: Urine microscopy was done in all cases. There was hematuria either macro/micro in 10 cases. All the cases showed renal injury on CT scan.

Plain X-ray Erect Abdomen: Plain erect X ray of abdomen was done in 45 cases. Gas under diaphragm was found in 5 cases. In

Davis et al.,⁹ study abdominal X ray was abnormal in 21% cases. In our study it is abnormal in 22% of cases of BIA (Blunt Injury Abdomen).

USG abdomen (Focussed Assessment with Sonography for Trauma) was done in all cases out of which 45 cases had solid organ injury. Therefore USG abdomen is more reliable in detecting solid organ injury and free fluid in the abdomen.

ORIGINAL ARTICLE

Organ Injured	Our Study	Cusheri, ¹	Davis et al, ⁹	Cox et al, ¹¹	Khanna et al, ¹⁰
Spleen	54%	25%	25%	46%	26%
Liver	30%	15%	16%	33%	37%
Kidney	12%				
Pancreas	4%				
Ultrasound examination (FAST)					

From above table, spleen is the most common organ injured in BIA as compared to international series, accounting to 54%, followed by liver in 30% cases and kidney in 12% cases. Imaging is essential in early decision making. Focussed Assessment with Sonography in Trauma (FAST) examination of pericardial, perihepatic, perisplenic and pelvic areas help in early detection of clinically significant abdominal injury. FAST examination can be performed repeatedly and is an excellent adjuvant to physical examination.

CT Scan Abdomen: CECT was done in 36 cases. Rest of the patients which were managed conservatively, patients were not affordable and some were hemodynamically unstable and were taken for exploratory laparotomy.

Computed tomography (CT) can provide reliable information on haemoperitoneum, extent of solid organ injuries, retroperitoneal organ injuries, most cases of hollow viscus perforation and ongoing bleeding by means of radiographic blush.

Treatment	No. of Cases	Percentage
Conservative	15	30%
Operative	35	70%
Ratio of Operative to Conservative Treatment		

There is an increase in trend towards conservative management if the patient is hemodynamically stable. The grade of injury was assessed by CECT. Minor lacerations and capsular tears which are difficult to diagnose clinically can be easily demonstrated in CECT scan and were selected for nonoperative management. However the disadvantage of non-operative management is missed injuries resulting in increased morbidity and mortality.

Organs injured	No. of Patients	Percentage
Spleen + hollow viscus	3	86%
Spleen + renal	2	4%
Spleen + liver	2	4%
Renal + hollow viscus	2	4%
Spleen + Liver + renal	1	2%
Liver + pancreas	2	4%
Total		24%
Multiple Organs Injured		

ORIGINAL ARTICLE

Above table shows incidence of multiple organ injuries in our study. In 24% of cases there was multiple organ injury in the abdomen.

Operative Procedure: In the present study, closure of bowel which was associated with solid organ injury was done in 5 cases. Splenectomy was done in 25 cases because of hemodynamic instability and severity of injury. Splenorrhaphy was done in 2 cases and most of liver injuries were managed conservatively. Hepatorrhaphy was done in 4 cases. All renal injury cases were managed conservatively. Drainage procedure was done in 2 patients of pancreatic injury.

Mortality: Total 7 patients died in our study. 3 patients belonged to operative group. They died in postoperative period, majority of them died due to septicemia, 3 patients died during resuscitation. 1 patient died due to severe head injury. Therefore mortality in the present study is 14% which is on par with the other published studies in our country (Khanna et al¹⁰). The mortality rate in Di Vincenti et al,¹² study was 23%. Cox et al,¹¹ study reports mortality of 10% and in Davis et al,⁹ study it was 13.3%.

CONCLUSIONS: Most common age group involved is 21-30 years. Predominantly males are affected in large proportions. Road traffic accident forms the most common mode of injury. So efforts should be made to bring road traffic regulations into strict action and traffic norms regulated. Well established trauma care centres should be established at every Taluka hospital. Measures for early transport of the patients from the accident site to the trauma centres should be undertaken. Clinical presentation is varied, sometimes confusing. Falling titres in serial hematocrit value indicates ongoing bleeding. With the advent of high resolution ultrasonography (FAST) and FQA (Four Quadrant Aspiration) investigations are becoming less opted. CECT forms the core investigation of choice in dealing with blunt injury abdomen patients, and becomes more important in deciding operative versus conservative management. Early diagnosis and repeated clinical examination and use of appropriate investigations forms the key in managing BIA injuries.

REFERENCES:

1. Cusher A, George Hanna A. R: Essential Surgical Practice; Butter worth International 4th Ed. 2013; p263-304.
2. Sabiston's Text book of surgery: 19 edition: vol 1: 2012: p455-459.
3. Skandalakis Surgical anatomy 3rd Ed.
4. Surgery of the liver and biliary tract: L. H. Blumgart: vol 1: 5 edition: 2013: 1277-1318 p.
5. Joe Jack Davis, Isidore Cohn, Francis C. Nance; Diagnosis and management of Blunt abdominal trauma. Ann, Surg, June 1976: vol 183: No 6; p672-678.
6. Schwab CW. Selection of nonoperative management candidates. World J Surg 2001; 25: 1389-1392
7. Scalea TM, Rodriguez A, et al. Focussed assessment with Sonography for Trauma (FAST): result from an international consensus conference. J Trauma 1999; 46: 466-472.
8. FA Moore, J Nelson, BA MC Kinley massive transfusion in trauma patients tissue haemoglobin, oxygen saturation predicts poor outcome, journal of trauma 2008.
9. Joe Jack Davis, Isidore Cohn, Francis C. Nance; Diagnosis and management of Blunt abdominal trauma. Ann, Surg, June 1976: vol 183: No 6; p672-678.

ORIGINAL ARTICLE

10. R. Khanna, S Khanna, P Singh, Puneet and AK Khanna; Spectrum of blunt abdominal trauma in Varanasi; Quart J; vol. 35, No 1 & 2, Mar & Jun 1999; p25-28.
11. Cox, Everard F; Blunt abdominal trauma: A 5 year Analysis of 870 patients requiring Celiotomy; Ann, Surg; April 1984 vol199; p467-474.
12. Di Vincenti F C, River JD, Laborde EJ, etal: Blunt abdominal trauma. J Trauma 8:1004, 1968.

AUTHORS:

1. Katta Srinivasa Rao
2. D. Gopikrishna
3. Md. Aslam
4. G. Subba Rao

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Surgery, Guntur Medical College, Guntur.
2. Assistant Professor, Department of Surgery, Guntur Medical College, Guntur.
3. Senior Resident, Department of Surgery, Guntur Medical College, Guntur.

FINANCIAL OR OTHER

COMPETING INTERESTS: None

4. Professor & HOD, Department of Surgery, Guntur Medical College, Guntur.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Katta Srinivasa Rao,
Door No: 4-22-85/3A,
1st Lane, Balaji Nagar,
Mutyala Reddy Nagar Extn.,
Guntur – 522007,
Andhra Pradesh.
E-mail: kattasrinivas2070@yahoo.com

Date of Submission: 10/09/2015.
Date of Peer Review: 11/09/2015.
Date of Acceptance: 21/09/2015.
Date of Publishing: 29/09/2015.