

BLUNT ABDOMINAL TRAUMA WITH HAEMOPERITONEUM TREATED BY EXPLORATORY LAPAROTOMY VERSUS ONLY ABDOMINAL DRAINAGE: A PROSPECTIVE AND COMPARATIVE STUDY.

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Abstract

In today's mechanized world, Blunt Abdominal Trauma (BAT) is a common emergency which is associated with considerable morbidity and mortality. More than 75% of abdominal traumas are blunt in nature and liver and spleen are the commonest organs to be injured as a result of BAT. The aim is to analyse and compare two groups of patient of blunt abdominal trauma managed conservatively with drainage and one by exploratory laparotomy. 50 cases of blunt abdominal trauma were taken. The patient were studied which includes age, sex, mode of injury, initial vitals on presentation, Mortality in each group, duration of hospital stay, pre interventions and post interventions state and requirements, complications and follow up. It was observed 48% of patients were in between age group ranging from 10 to 30. Overall in terms of sex ratio, males dominated the no. of cases. RTA was most common mode of trauma. Liver and spleen was most common organ to be injured. Patients managed by laparotomy had higher mortality rate, duration of hospital stay was more, and complication were more. Early diagnosis and repeated clinical examination and use of appropriate investigation form the key in managing blunt injury abdomen patients.

Keywords: Blunt Abdominal Trauma, Haemoperitoneum, laparotomy, Abdominal Drainage.

Introduction

With modernization, industrialization and motorization of the society there is a rapid increase in the incidence of Blunt Abdominal trauma (BAT). It is one of the most common injuries amongst those caused due to road traffic accidents [1]. Injuries are reported to be amongst the top 10 killers around the world and abdominal injuries are amongst the top 3 of these overall cases. Majority of these abdominal injuries (> 80%) are of blunt character. Spleen and liver are found to be injured in majority of cases of BAT. Other injuries which may be seen include renal injuries, injuries to urinary bladder and urethra, pelvic fractures and vascular injuries. Motor vehicle accidents account for 75 to 80% of blunt abdominal trauma [2]. Blunt injury of abdomen can also occur as a result of fall from height, assault with blunt objects, industrial mishaps, sport injuries, bomb blast and fall from riding bicycle [3]. Blunt abdominal trauma is usually not obvious hence, often missed, unless, repeatedly looked for. Delay in diagnosis and inadequate treatment of the abdominal injuries may prove fatal. The status and co-existing injuries which may distract the attending surgeon from properly assessing difficulty in diagnosis arises from the factors like delay in

reaching hospital, altered mental status of the patient and co-existing injuries making the diagnosis difficult [4]. The factors like altered mental status of the patients makes it necessary that the management should not be based entirely on the basis of clinical examination and rather should be assisted by imaging like FAST (Focused assessment of sonography in trauma) and computed tomography (CT)[5]. The management needs multidisciplinary approach. In spite of the best techniques and advances in diagnostic and supportive care, the morbidity and mortality remains at large [6]. The usual complication arising out of BAT includes hemorrhagic shock due to blood loss. Fluid resuscitation and non operative management is all that is needed in haemodynamically stable patients with BAT. But in some cases refractory shock not responding to aggressive fluid resuscitation may be seen. In such patients one of the main concerns from the point of view of a treating surgeon is control of bleeding [7]. Continued intraabdominal bleeding secondary to vascular injuries may be the cause of patient not responding to fluid resuscitation and in such patients surgical interventions like therapeutic laparotomy and appropriate measures to stop bleeding (ligation of

bleeders) may prove life saving [8]. The other indications for surgical interventions may include extensive renal injuries, expanding hematoma and extensive splenic injuries [9]. The major causes of mortality in cases of BAT include delay in seeking treatment, poor general condition and associated injuries (Head injury, lung laceration and multiple rib fractures etc) [10]. Majority of the patients can be saved if Proper diagnosis of BAT and associated injuries is done and appropriate resuscitative measures along with surgical intervention (if needed) are done [11]. Earlier it was a trend to operate each and every case of blunt abdomen trauma with hemoperitoneum. However, today that practice is usually contemplated and practice of conservative management has been widely encouraged. Conservative management is cost effective, reduces the rate of negative laparotomy. However sometimes conservatively managed patient might require surgical intervention if patient becomes vitally unstable or the nature of injury mandates the surgery. The exact criteria of which patient requires laparotomy which requires conservative management cannot be delineated. The overall aim should be better management, speedy recovery and without any post interventional sequelae and complications.

Aims and Objectives: The aim is to analyse and compare two groups of patient of blunt abdominal trauma managed conservatively with drainage and one by exploratory laparotomy in terms of:

- The patient profile which includes age, sex, mode of injury, initial vitals on presentation
- Mortality in each group.
- Amount of hospital stay.
- Pre interventions and post interventions state and requirements.
- Complications and follow up.

Material and Methods:

The study was conducted in Department of General Surgery, Sir T. Hospital Bhavnagar and Government Medical College, Bhavnagar in year 2017-2019. Ethical clearance was taken from institutional ethical committee. This study took into account the patients admitted with alleged history of blunt abdominal trauma. The individuals will be selected in the basis of the inclusion and the exclusion criteria. 50 cases Of blunt abdominal trauma were taken.

Inclusion criteria:

- Patients admitted with history of blunt abdominal trauma due to vehicular accidents, fall down
- In children injury due to the recreational activity like bicycling and swimming were also considered.
- Hemodynamically stable patients after initial resuscitation with systolic blood pressure of 90 mm of Hg or more.

- Patients with hemoperitoneum having solid organ injury in blunt trauma to abdomen.
- Patients in age group of 2 to 60 years with no sex preference.

Exclusion criteria:

- Hemodynamically unstable patient with systolic blood pressure of less than 90 mm of Hg despite resuscitation.
- Patients with penetrating abdominal injuries.
- X-ray abdomen standing showing free gas under diaphragm.
- Four Quadrant Aspiration showing bilious aspirate.
- Pregnant patient.

The patients were taken according to the above criteria. A proper consent was explained and taken. Thorough careful history was taken along with thorough general and systemic examination. After initial resuscitation of the trauma victims, a careful history was taken to document mode of injury, and any associated medical problem. Routine blood and urine tests were carried out in all the patients. Documentation of patients, which includes identification, history, clinical findings, diagnostic tests, operative findings, operative procedures, complications during the stay in the hospital and during subsequent follow-up period, was recorded on a proforma specially prepared. Demographic data collected includes the age, sex, occupation and nature and time of accident leading to the injury. All patients were thoroughly examined after achieving hemodynamic stability. Depending on the clinical findings, decision was taken for further investigations such as four-quadrant aspiration, diagnostic peritoneal lavage(DPL), x-ray abdomen and ultrasound. It also includes focused assessment with sonography in trauma (FAST), the decision for operative or non-operative management depends on the outcome of the clinical examination and results of diagnostic tests. Patients selected for nonoperative or conservative management were placed on strict bed rest, were subjected to serial clinical examinations which included hourly pulse rate, blood pressure, respiratory rate and repeated examinations of abdomen and other systems. Appropriate diagnostic tests especially ultrasounds of abdomen were repeated as and when required. Apart from routine investigations, abdomen x ray and ultrasound was done in all 50 patients. CECT abdomen was done as and when required. All 50 patients will undergo four quadrant aspirations. An aspiration of blood, which does not clot, is to be taken as positive. When the aspirate clotted, the test is taken as negative. Two groups of cases are taken and following variables will be compared in them:

- 1) Hospital stay
- 2) Involvement of the patients in comparison with age and Sex.

- 3) Associated injuries.
- 4) Mortality
- 5) Post interventional sequelae and complications

Results:

From the data collected of 50 patients of blunt abdomen trauma with hemoperitoneum, following observations were made in terms of age, sex of the patient, amount of hospital stay, mode of injury, organs injured, mortality and post-operative complications and sequelae.

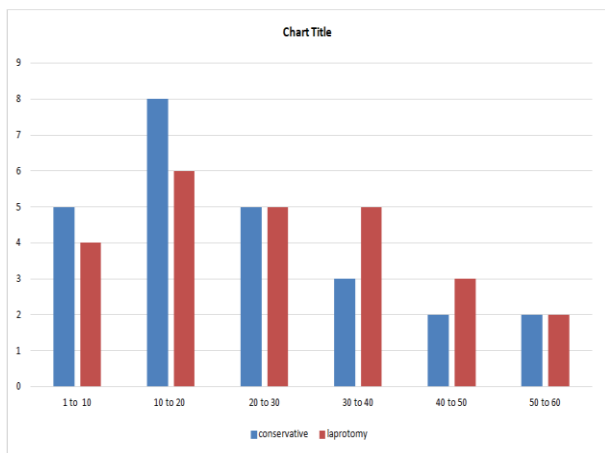


Diagram 1: Comparing the age groups managed by Conservative and laparotomy intervention.

As seen, the no. of case in each age group are almost the same. Overall 48% of patients were in between age group ranging from 10 to 30. In case of conservative management by drainage 52 % patients were in the age group 10 to 30. In case of laparotomy 44 % patients were in age group of 10 to 30.

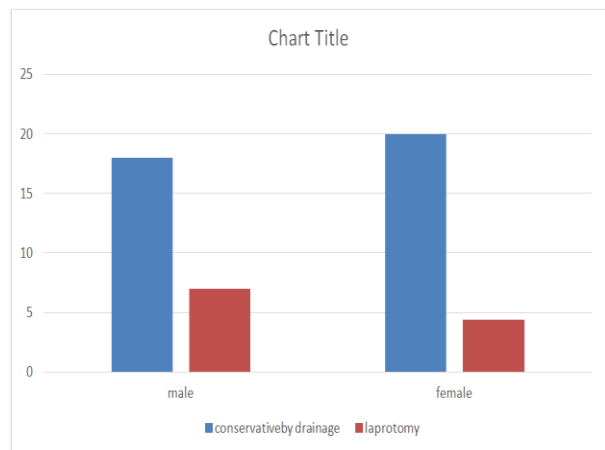


Diagram 2: Sex wise distribution of patients in 2 methods of treatment.

As evidenced from this chart male cases were more in each group. Overall 74% patients were male. And among the group managed conservatively 72% were males, while in case of laparotomy 80% were males.

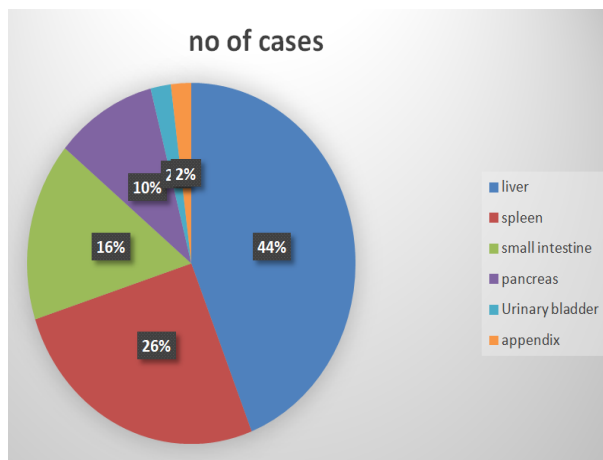


Diagram 3: Incidence of organs injury.

Diagram 3 shows liver and spleen were most commonly injured organs in blunt abdominal trauma.

Table 1: Method of intervention.

Organ injured	Drainage	Laparotomy
Liver	77.2%	22.8%
Spleen	33.3%	67.7%
Pancreas	20%	80%
Urinary Bladder	50%	50%
Small Intestine	0	100%

Out of 22 cases of liver injury, 17 of them were managed conservatively and 5 underwent laparotomy. More than 70 % cases were managed conservatively. The patients managed conservatively had injury ranging from grade 1 to 3 according to the AAST scale. Out of 12 cases of spleen injury, 4 of them were managed conservatively and 8 underwent laparotomy. More than 60 % cases required laparotomy. The patients managed conservatively had injury ranging from grade 1 to 2 AAST scale. Out of 5 cases of pancreatic injury, 4 of them underwent laparotomy and one was managed conservatively. Out of 8 cases of small intestines, all underwent laparotomy. Out of 2 cases of urinary bladder injury, one was managed conservatively and the other was managed with laparotomy. There was only one case of blunt abdomen trauma which presented with ruptured appendix in which surgical intervention was taken.

Table 2: Complications associated with each intervention.

Post-operative complications and sequelae	Laparotomy	Drainage
Sinus tract infection	4	0
Surgical site infections	7	0
UTI, urethral stricture	1	0
MODS	3	0
ARDS	2	1
Pseudocyst formation	1	0
Intra-abdominal abscess	2	0

Table 2 shows Out of the 24 patients that survived in the conservative management by drainage group, it was observed that there were no significant post interventional complications or the sequelae .However same cannot be said about the patients managed with the laparotomy group, it was observed that 10 patients out of the 20 which survived had post-operative complications and sequeale,out of them to name a few in majority and of significance which included sinus tract infection, surgical site infection, chronic urinary tract infection, urethral stricture,intra-abdominal abscess and Pseudocyst formation. Out of patient that expired were a result of patient landing into multi organ dysfunction (MODS) and acute respiratory distress syndrome (ARDS).

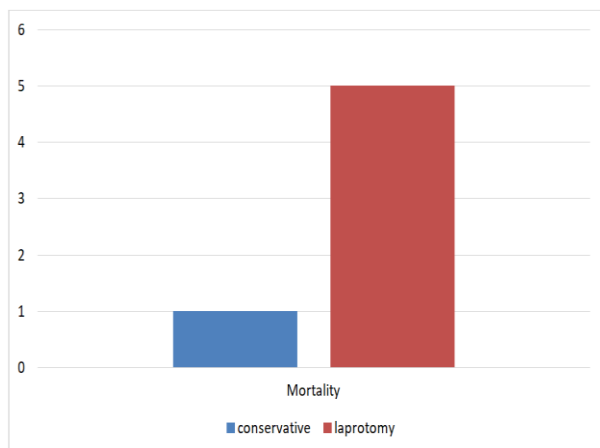


Diagram 4: Mortality associated with each intervention.

It was observed that out of the two ,mortality was definitely more in laparotomy group.

5 out of 25 cases managed by exploratory laparotomy expired due to various causes like septicaemia, shock, ARDS and others and similarly only one case of 25 managed conservatively via drainage expired. Clearly the mortality was more in cases managed by laparotomy than conservatively by drainage.

Table 3: Hospital stay

Method of intervention	Drainage. Mean value (Days)	Laparotomy. Mean value (Days)
No. of days	9.4 ±5.02	13.11±11.04

Within the two groups of management of hemoperitoneum,Out 25 patients managed conservatively with drainage it was found that 24 patients survived and one expired with average hospital stay of 9.4 days and median of 9 days.And out of 25 patients managed by exploratory laparotomy 20 patients survived and 5 expired with average hospital stay of 13.11 days and median days of 11 days. The hospital stay is higher in case of laparotomy than drainage but the difference is statically not significant.

Discussion:

Out of 50 patients of blunt abdomen trauma with hemoperitoneum studied at the Sir T Hospital,Bhavnagar. Half of them were managed by conservative approach of abdominal drainage and other half were managed by exploratory laparotomy.

AGE of the patient: It was found that most no. of case were in the young age group from age group 10 to 30 years of age, as the younger group of people It was found that the in the group managed conservatively by drainage the larger no. of patients were in younger age group and so as those managed by laparotomy. Overall 48% of patients were in between age group ranging from 10 to 30.In case of conservative management by drainage 52 % patients were in the age group 10 to 30.In case of laparotomy 44 % patients were in age group of 10 to 30.Age of the patient doesn't seem to have influence on the mode of management.

SEX of the patient: Overall in terms of sex ratio, males dominated the no. of cases as evidenced the males are more involved in accidents, drinking, assault and other injury prone activities. Similarly it was observed that the group managed conservatively and by laparotomy, in both the groups male patients were more. Sex of the patient doesn't seem to influence the mode of management. Madhumita Mukhopadhyay et al in their study of 47 patients who underwent laparotomy following intestinal injuries from blunt abdominal trauma over a period of 4 years found that the M:F ratio in this study was 8.4:1 [12]. Similarly John L Kendall et al in a retrospective cohort study of 1169 cases of BAT reported that 66% of the affected individuals were Males [13].

Aetiology: Among the aetiology leading to the blunt abdomen trauma with hemoperitoneum, it was found that it is usually the high velocity or the high energy impact that leads to hemoperitoneum rather than the trivial traumas. Modes of injuries were Road traffic accident, Bike handle injury, Fall down , Assault. Out of these road traffic injuries were causative for 60% of the patients, followed by fall down injuries which were involved in 30 % of the patients. The incidence of bike handle injuries and assault injuries leading to hemoperitoneum was relatively low 8% and 2% respectively.It was found that the road traffic injuries were associated with other concomitant injuries like rib fractures, hemothorax, fracture of femur, fracture of tibia and fibula, fracture of humerus, fracture of pelvis and a few cases of brain injuries. The association of these concomitant injuries increased the associated comorbidity and thus significantly increasing the hospital stay. The presence of these injuries were also associated with greater post interventional sequelae and complications . Majority of the RTA patients were vitally unstable at the time of presentation, which obviously were subjected to intensive resuscitation by fluid and blood products and respiratory support. Subsequently the patients which

remained stable after the initial resuscitation were subjected to the battery of blood and radiological investigation like FAST and CT scan to delineate the exact nature of the injury and given the trial of conservative management by drainage. Among the most patients managed conservatively recovery was speedy without any associated comorbidity and post interventional sequelae. However few cases which responded to the resuscitation were also subjected to the exploratory laparotomy as decided after knowing the nature of injury using the radiological investigations. The patients which did not respond to the initial resuscitation were subsequently subjected to the laparotomy. These patients were associated with high amount of morbidity and mortality. The fall down injuries are usually high impact injuries. These patients were relatively more stable on presentation and were managed conservatively by drainage in the majority of the cases and laparotomy required in very fewer number of cases. The patients who were involved in bike handle injuries were relatively fewer. The problem with the bike handle injuries is that these injuries usually target the epigastric and hypochondriac regions, thus probability of the injuries of the pancreas, liver and spleen is relatively more. In our study bike handle injuries were associated with pancreatic injury and thus surgical intervention was required in 80% of the cases. The findings were similar to those found in the study of anuradha et al [14] and velamahos et al [15].

Hospital Stay: It is universal that the all patients of blunt abdominal trauma with hemoperitoneum require admission and intensive monitoring. In our study we found out that on average there was a hospital stay of 9.4 days with median days of 9 days for group managed just with drainage. The average hospital stay was 13.11 days with median days 11 days, the group managed by laparotomy. As evidenced the hospital stay was more in the group managed by laparotomy. Amount of the stay was directly proportional to the amount of the injury. Patients who were unstable vitally like hypotension, tachycardia and tachypnea though responded to initially resuscitation had more frequency of laparotomy in comparison to those patients who were stable on presentation, similar were present in study conducted by velmahos et al and weldji et al [16].

Post Interventional Complications and Sequelae: The complications were more in the group of the patients managed surgically as compared to the drainage. The complications found among the patients survived included surgical site infection, sinus tract infection, urinary tract infection, urethral stricture, intra-abdominal abscess and Pseudocyst formation. Overall, comparing the rate of occurrence of complications among the two groups, the occurrence was definitely higher in the laparotomy group. Overall among the complications the occurrence of surgical site infection was more. It was seen in cases of pancreatic injury and intestinal injuries. The incidence of

intrabdominal and Pseudocyst formation was particularly present in the cases of pancreatic injury. The complication of the urethral stricture was present in the case of the bladder injury.

Mortality: Out of 50 patients that underwent study it was found that 6 patients succumbed. The patients who were vitally unstable on presentation, with multiple injuries and those who required more blood transfusions were more prone to succumbing. Out of 25 patients managed by laparotomy, there was mortality of 5 and 25 patients managed by drainage, there was only 1 mortality. Clearly observed the mortality was more in the group of laparotomy. The reason of the mortality can be attributed to patient landing in septicemia, Multi organ dysfunction, and acute respiratory distress syndrome. These patients had higher grades of organ injury too.

Conclusion:

From our prospective and comparative study of 50 patients of blunt abdominal trauma with hemoperitoneum managed drainage versus laparotomy we conclude following that Blunt abdominal trauma with hemoperitoneum was more present in male patients and young group of population. The liver was the most commonly involved organ followed spleen. The Road traffic accidents were most common mode of injury. The CT scan is the gold standard in the diagnosis of blunt abdominal trauma in quantifying injuries. The patients of blunt abdominal trauma with hemoperitoneum require intensive monitoring and aggressive resuscitation to increase the survival chances. The more injuries the patient sustains, the higher the grades of injury more the patient undergoes laparotomy. The patients with blunt abdomen trauma with hemoperitoneum with the solid organ injury who are stable hemodynamically can be managed conservatively. However similar can't be said about hollow organs as these require further investigations. Over all non-operative management of drainage is associated with fewer complications and mortality. However overall both group require good infrastructure of patient monitoring and team work. Early diagnosis of extent of injury by appropriate imaging (X-ray, Ultrasound or CT abdomen) and appropriate interventions (Aggressive fluid resuscitation, blood transfusion and operative interventions) are crucial in management. Associated Injuries like head injury, abdomino-thoracic injuries and fractures influence the outcome.

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