Section: Miscellaneous

Original Research Article

A PROSPECTIVE OBSERVATIONAL STUDY OF DIAGNOSIS & MANAGEMENT OF 100 CASES OF BLUNT ABDOMINAL TRAUMA IN A TERTIARY CARE CENTRE

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ABSTRACT

Background: Trauma being major public health problem in all countries. In this study we evaluated 100 patients presenting to major trauma centre of Mumbai. We assessed pattern of injury, major organ involved, diagnostic tools and its management and outcome in blunt abdominal trauma cases.

Materials and Methods: We evaluated all blunt abdominal trauma cases presented to our centre during period of two years. We assessed patients in terms of mechanism of injury, investigational tools used (FAST, CT, Xray), organ injured, approach of management whether conservative or surgical and outcome of patients including morbidity and mortality.

Results: Study enrolled 100 patients suffering from blunt abdominal trauma. Most common cause was road traffic accident (64%) followed by fall from height (24%), hit by blunt objects (6%) and assault (6%). X ray was most common diagnostic tool used followed by FAST and CT scan. DPL was used occasionally. Spleen was most commonly injured organ (30%) followed by liver (18%), small bowel and mesentery. Most cases (56%) were managed conservatively whereas 44 (44%) cases were managed surgically. Splenectomy was the most common operative procedure done (13% of total patients). Wound infection was most common post operative complication which was present in 27.27% of operated cases. Mortality of 10% was reported in study and most common cause of death was septicaemia.

Conclusion: This study investigated mechanism of injury, common organs involved, diagnostic tools and outcome of patients following blunt abdominal trauma in major trauma centre of Mumbai.

Key words: Blunt abdominal trauma, diagnostic tools, outcome.

INTRODUCTION

Trauma remains major public health issue in all countries irrespective of socioeconomic development and is still most frequent cause of death in younger population in their first four decades of life. Traumatic brain injuries and injury to major vessel and heart remain first two leading cause of death.[1,2,3] Abdominal injuries are third most common site of injury requiring surgery in almost 25% of cases. Abdominal injuries whether blunt or penetrating cause considerable morbidity and mortality. Further, unrecognised abdominal injuries remains significant cause of preventable death in trauma patients.[4]

Diagnostic and interventional modalities for abdominal trauma patients is evolving. Diagnostic peritoneal lavage (DPL) considered initially as standard modality for diagnosing modality is rarely used now due to availability of advanced tools like bedside USG and computed tomography (CT).[5] However, DPL is still sometimes being used in combination with CT scan to avoid non-therapeutic laparotomy.[6,7] Recently, management of abdominal trauma focus shifted from operative to conservative line of management with newer modalities to

control haemorrhage like angioembolisation and haemostatic control.[8] However, this approach may have possibility of missing injury and may delay diagnosis of patient.[9]

Recent studies have identified multiple risk factors which increased morbidity and mortality including shock at the time of admission, duration of time passed between trauma to abdomen and intervention, traumatic brain injury and gender.[10] However, pattern of injury and requiring intervention needs to be studied in detail so as to educate trauma surgeons and other team members involved actively in managing in trauma patients. Hence we conducted a study to know pattern of injury in abdominal trauma patients, intervention needed and determine risk factors leading to morbidity and mortality.

MATERIALS AND METHODS

This was prospective observational study conducted in trauma centre and tertiary care institute of Mumbai during period of 2 years. Our trauma centre serves vast and densely populated area and remains major referral centre for trauma and emergency cases. Trauma centre maintains registry which maintains complete information regarding trauma patients arriving to institute.

We enrolled 100 adult trauma patients (aged 18-60 years) admitted to the hospital with an abbreviated injury scale (AIS) code for the abdominal cavity. We excluded patients not willing to give consent, having pelvic fracture spine injury and traumatic brain injury. The following data were collected:

1) Sociodemographic data: Age, sex, residence, and arrival time.

2) Clinical data: Various solid organ and hollow viscus organ injuries, definitive treatment option followed - conservative or operative, duration of stay in hospital, incidence of wound infection in patient with operative management, post-operative complications and number of deaths.

Statistical Analysis

All data were entered and coded using Microsoft Excel and analysed with Statistical Package for Social Sciences (SPSS) version 10.0 Chi-square, nonparametric and multiple logistic regressions tests were used to compare categorical variables; all other analyses relied on the independent t-test or one way analysis of variance (ANOVA). In all cases, we relied on a P value of <0.05.

RESULTS

We enrolled 100 patients of blunt abdominal trauma of which most patients were in age group of 18-38 years (82%) with mean of 30.23 ± 9.94 years .(Table 1). Most (80%) of these patients were male. Average hospital stay of these patients varied from 2-44 days with mean stay of 12 days. (table 1)

Table 1: Demographic data of patients

Serial No.	Parameter	
1	Age(Mean±SD)	30.23 ± 9.94 years
2	Gender Male: female	80:20(80%:20%)
3	Duration of Hospital stay	11.84 ± 7.37 days(2-44 days)

In our study, most injury occurred in road traffic accidents followed by fall from height. (Table 2)

Table 2: Mechanisms of injury of patient

Serial number	Mechanism	Number of patients (%)
1	Road traffic accidents	64(64%)
2	Fall from height	24(24%)
3	Hit by blunt objects	6(6%)
4	Assault	6(6%)

Table 3: Clinical evaluation (signs/symptoms) results blunt of abdominal trauma patients

Serial no	Signs/symptoms	Number/percentage of patients
1	Pain in abdomen	90
2	Vomiting	34
3	Abdominal distention	14
4	Urinary retention	10
5	Tenderness	90
6	Guarding	47
7	Rigidity	15
8	Absent bowel sound	20
9	Shock	19
10	Asymptomatic	03

Most common presenting symptom was pain in abdomen(90%) while commonest sign was tenderness(90%)(Table 3). In total, 19 patients presented with shock, out of which 3 had gas under diaphragm on X ray chest, so they were explored. Two of these patients had jejunal perforation while remaining one had duodenal perforation with associated liver injury. Remaining 16 patients with

shock at presentation, continued to remain 85 hypotensive after initial fluid resuscitation and FAST showed positive signs. All these patients were explored. Ten cases had splenic injury, 5 cases had liver injury, 1 case had large bowel injury.

Table 4: Investigations done in patients

Serial no	Investigations	Number/percentage of patients
1	X ray chest	100
2	FAST	82
3	CECT abdomen and pelvis	30
4	DPL	1
5	MRCP	1

In our study, X-ray chest was done in all 100 cases. Eighteen of the total cases showed gas under diaphragm on X- ray chest indicating hollow viscus perforation, which was confirmed on exploration. Four patients had ileal perforation, 2 of these patients had associated mesenteric tear and one patient had associated urinary bladder injury. Eight patients had jejunal perforation, 2 of them presented with shock. Out remaining 6, 4 patients had associated pancreatic injury, mesenteric tear, urinary bladder injury, retroperitoneal hematoma each. Two patients had stomach injury, with one had associated liver injury and other had associated splenic injury. Four patients had duodenal injury, one of them presented with shock and also had liver injury. One of the remaining 3 had splenic injury.

FAST was done is 82 cases. Out of these , positive result i.e. free fluid was found in 49 cases, out of which 47 cases had actual intra-abdominal injury which include 26 cases of splenic injury, 15 cases of liver injury, 3 cases of large bowel injury, 2 cases of stomach injury and one case of pancreatic injury. Remaining 2 cases, out of 49 cases did not have any injury. Negative result was found in 33 cases, out of which 30 cases actually did not have any injury while 3 cases were having intra-abdominal injuries which include 2 cases of splenic injury and one case of liver injury.

In total, 30 patients were subjected to CT scan, out of which 17 patients had findings of splenic injury, 8 patients had liver injury and one patient had pancreatic injury. Two patients showed pneumoperitoneum on CT, which on exploration showed stomach perforation in both cases. One of these patients had associated retroperitoneal hematoma. CT scan was normal in remaining two patients. DPL was done in one case of pancreatic injury to estimate the intra-abdominal fluid amylase levels which were found raised significantly. MRCP was done in same case of pancreatic injury to confirm the diagnosis of pancreatic duct transection which was indicated on CT scan.

Table 5: Specific organ injuries and management approach

Serial number	Organ involved	Number/percentage	Surgical management	Conservative management
1	Spleen	30	13	17
2	Liver	18	11	7
3	Small bowel	16	16	-
4	Mesentery	3	3	-
5	Large bowel	3	3	-
6	Stomach	4	4	-
7	Pancreas	2	2	-
8	Urinary bladder	2	2	-
9	Retroperitoneal hematoma	2	2	-
10	No organ injured	32	-	32

In this study, (table 5)spleen was the most common organ involved in 30 (30%) of cases, liver was the second most common organ injured in 18 (18%) of cases. Small bowel was injured in 16% of cases. Large bowel, mesentery each was injured in 3% cases. Stomach was injured in 4% of cases. Pancreas and urinary bladder each was injured in 2% cases. Retroperitoneal hematoma was found in 2% cases. Amongst these 100 patients, 12 patients had two organs injured simultaneously as follow: three patients had small bowel and mesenteric injury. One patient had ileum and urinary bladder injury. Spleen and stomach injury was present in one patient. Other one had spleen and duodenal injury. One patient had liver and duodenal injury. Pancreas and jejunal injury was present in one. A patient had liver and stomach injury. A patient had stomach injury and retroperitoneal hematoma. A patient had jejunal and urinary bladder injury. Remaining one had retroperitoneal hematoma and jejunal injury. All of these twelve patients were managed operatively.

Table 6: Post operative complications (n = 44)

Serial number	Complications	Number/percentage of patients
1	Wound infection	12(27.27%)
2	Wound dehiscence	1(2.27%)

3	Pneumonia	2(4.54%)
4	Anastomotic leakage	2(4.54%)
5	Intestinal obstruction	2(4.54%)

Wound infection was the most common complication after surgery seen in 12 (27.27%) cases. Two patients (4.54%) developed pneumonia. Anastomotic leak and intestinal obstruction was developed in 2 (4.54%) cases each. Wound dehiscence developed in 1 (2.27%) of cases (Table 6).

We had 10 patients who succumbed after admission. Septicaemia was the most common cause of death (6 cases). Two patients died of uncontrolled bleeding. One patient died of sudden cardiac arrest and the remaining one died of ARDS. All of the patients who died, were post-operative cases. None of the patients succumbed who were managed conservatively.

DISCUSSION

approach and management.

Road traffic accidents remain common cause of blunt abdominal trauma. We found that, vehicular accident were responsible for blunt trauma of abdomen in 64 %of cases while fall from height was responsible in 24% of cases. Other causes were hit by blunt objects and assault. Similar findings were reported in other studies where road traffic remains most common cause of blunt abdominal trauma.[11,12,13]

In our study pain in abdomen(90%) was most common symptom followed by vomiting(34%) and distention of abdomen(14%) whereas tenderness was reported most common sign(90%) of case followed by guarding (47%) and rigidity(15%). Mohapatra et al. also found abdominal pain as commonest symptom and tenderness as most common sign.[14]

Tools for investigating abdominal trauma has evolved over a period of time. Finding a source of bleeding in patient presenting with shock remains challenging. It is routinely done using chest x-ray, pelvic x-ray and finding out blood in peritoneal cavity. DPL once commonly used to assess blood in peritoneal cavity has largely been replaced by FAST. A survey in 1999 revelled that FAST remains commonly used technique for abdominal assessment in more than 80 %centres.[15]

In hemodynamically unstable patients, FAST has emerged as most useful tool in defining intraperitoneal fluid as well as pericardial fluid when injury is close to heart. Other useful tool is CT scan as it not only helps in establishing diagnosis but also helps in nonoperative management of patients which can undergo angioembolisation.[16,17] Further, faster scan with greater accuracy makes it more important diagnostic tool.[18]

In our study x- ray was done in all cases while FAST was done in 82 cases where X-ray had negative findings. Out of 82 patients, 49 patients had shown intraperitoneal fluid out of which 47 cases had actual intra-abdominal injury including splenic, liver, bowel injuries. Negative result was found in 33 cases, out of which 30 cases actually did not have any injury. This emphasises importance of FAST in assessing blunt trauma abdomen cases. CT scan was done in 30 cases out of which 17 had significant findings including splenic injury and liver injury. Amongst these patients, 50% were manage conservatively thereby showing importance of CT scan in conservative approach. DPL was performed in on case of pancreatic injury which showed high amylase levels in fluid. Although its use is declined over years but still has diagnostic importance in institute where bed side USG is not available and shifting hemodynamically unstable patient is challenging. It may also be useful in diagnosing hollow viscus injury and avoid laparotomy (non-therapeutic) in patients showing free fluid in abdomen without evidence of solid visceral injury in CT scan. However, in many institutes availability of laparoscopy has reduced its use in diagnostic modality.

In our study, spleen was the commonest organ (30%) injured. Out of these 30 cases, 17 were managed conservatively and 13 were operated. Splenectomy was done in all 13 cases. Liver is the next most commonly involved solid organ in 18 cases. Out of which 11 were operated and 7 managed conservatively. These finding were similar to those of Lone et al. who also found spleen to be commonest injured organ.[19]

Out of 100 cases in our study 44 (44%) were managed surgically and 56 (56%) were managed conservatively. Our reports are comparable to Mohapatra et al. who reported 39% laparotomy rates in their series.[14] In our study, 5% patients underwent non therapeutic laparotomy.

In our study a total of 48 cases were found to be having liver or splenic injury. Out of which 24 (50%) were managed conservatively and 24 cases (50%) were managed surgically. All patients in non-operative group recovered uneventfully. There were three mortalities in operative group. Our study shows that 50% of hepatic and splenic injuries can be managed non-operatively. A study by Rutledge et al. showed that incidence of non-operative management in 48% of both hepatic and splenic injuries.[20]

Our study had mortality rate of 10% which was very high. Out of these 10 patients, 6 patients succumbed due to sepsis while other due to bleeding (2) ARDS (1) and sudden cardiac arrest (1).

CONCLUSION

Our study defines pattern of blunt abdominal trauma presenting to a major trauma centre of Mumbai,

India. It defines common symptoms and signs which should be looked which would aid in assessing common intra-abdominal organ injuries. It also defines investigational approach including FAST and CT scan for early diagnosis and intervention. FAST helps to detect intraperitoneal fluid while CT scan helps in establishing diagnosis as well as provides clue in patients requiring conservative management. Hemodynamically stable patients with solid organ injury conservative management can be tried and non-operative management is associated with less duration of stay in hospital, less complications and so less morbidity. Hemodynamic instability, hollow viscus perforation are contraindications to this approach. Mortality in patients with hollow viscus injury is commonly due to septicaemia and that in patients with solid organ injury is commonly due to uncontrolled bleeding.

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