A Study of Safety and Outcome of Non Operative Management of Blunt Abdominal Trauma

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Abstract
Blunt trauma continues to be the most common mechanism of injury to the abdomen. Now with the improvement in diagnostic & therapeutic intervention, modern treatment tilts more towards non-operative management of blunt trauma abdomen. This is a prospective study of 100 cases of blunt abdominal trauma, Managed in the Department of surgery S.C.B Medical college & hospital, Cuttack during the period from July 2010- Oct 2012, with special emphasis on non operative management based on clinico radiological examination. In this study, Males out number female in the ratio of 4:1 and the age ranging from 4 years to 69 years. Majority of cases were victims in 2nd, 3rd and 4th decades taking a toll of 71.25% of cases. Road traffic accident being the commonest cause.
Abdominal pain, tenderness, rigidity, shock, pallor, absence of bowel sounds and distension were the common manifestations found in patients with blunt abdominal injuries.
USG abdomen was the important tool in unstable patients to detect hemoperitoneum (61.3%) and to decide the protocol in stable patients for conservative management. However it missed 9 patients with splenic injuries, 5 with liver injuries, 3 with kidney injuries. It is a poor tool to detect kidney, pancreas, bowel and mesenteric injuries.
CECT abdomen is the most important tool in grading the organ injuries and deciding conservative management. CT detected 37 splenic injuries of which 29 were managed conservatively. 21 liver injuries were detected of which 16 were managed conservatively &5 cases of kidney injury were detected all of which were managed conservatively.
66 patients with blunt abdominal injury were managed conservatively. Spleen is the most common organ injured that managed conservatively. Out of 37 splenic injuries 29 were managed conservatively. Other organs which were managed conservatively are liver (16), kidney (5), bladder (2), pancreas (1) and mesentery (2).
Only one patient in the conservative group developed pseudocyst of pancreas. Another patient developed clot retention. The hospital stay period in the conservative group was 9-12 days.
There was no mortality in the conservative group. The overall mortality was 4% all in the operative group. The mortality was due to associated organ and system injuries.
The advent of sophisticated imaging technologies and adjunctive minimally invasive techniques has
somewhat lightened the trauma surgeon's operative burden. Despite that, more than ever, nothing surpasses the value of repeated clinical assessment by an experienced trauma surgeon, in guiding the ultimate therapeutic decisions. After all, the ultimate default pathway for severely injured trauma patients who failed non operative management is the operating theatre.

**Introduction**

Trauma is emerging as a serious public health problem in last two decades. It is the leading cause of death and disability in the first four decades of life and it is the third most common cause of death overall. Abdomen is the third most commonly injured body organ with injuries requiring operation, accounting in about 20% of civilian trauma Victims. Blunt trauma continues to be the most common mechanism of injury to the abdomen. (Gackowski W et al 1997). Blunt trauma has been recognized as a clinical emergency since long. It can be a formidable challenge to the surgeon on account of diversity of its presentation. Variation can range from a simple laceration or bruise to multi organ injuries with shock. The major problem in dealing with blunt trauma abdomen is that most commonly injured organs are solid, that bleeds slowly, therefore peritoneal signs may be lacking in the first several hours after admission to emergency room. So a high degree of suspicion and adequate vigilant observation is mandatory for proper care of the patient. The serious nature of the patient demands early & correct diagnosis & prompt management. Now with the improvement in diagnostic & therapeutic intervention, modern treatment tilts more towards non-operative management of blunt trauma abdomen.

Over the past two decades, there has been a major shift from operative to selective non operative management of traumatic injuries. The increased utilization of non operative surgical management of abdominal solid organ injuries is facilitated by the various sophisticated and highly accurate noninvasive imaging tools at the trauma surgeon's disposal. The non operative approach relies heavily on the availability of trauma trained surgeons, modern radiographic imaging, particularly FAST and CT scanning, accurate interpretation of such high quality radiographic images, as well as the presence of appropriate supporting infrastructure and ancillary services. FAST examination can be performed repeatedly providing an excellent adjunct to serial physical examination.

This review studies selected cases of blunt trauma abdomen, the potential complication and the pitfalls of non operative management in blunt abdominal trauma.

**Aims and Objective**

1. To study the epidemiologic and demographic distribution of blunt trauma abdomen in our population.
2. To study the severity of abdominal organ injuries in a blunt abdominal setting by using simple methods of physical examination and imaging techniques.
3. To make a decision and outline which type of patient with abdominal trauma will benefit and safely be managed by non operative management.
4. To find out the pitfalls of non operative management and vis-a-vis comparative study with operative management.

**Materials and Methods**

**Material**

This is a prospective study of 100 cases of blunt abdominal trauma, Managed in the Department of surgery S.C.B Medical College & hospital, Cuttack during the period from july 2010- Oct 2012, with special emphasis on non operative management based on clinico radiological examination.

**Selection criteria of the patient**

- All cases with suspected blunt trauma to abdomen due to various causes like road
traffic accident, fall from height, history of assault by blunt and heavy object over abdomen.

- Patient having a clinical suspicion of trauma to the abdomen.
- Injury occurring during natural calamity.

All age groups of both sexes were included in this study.

**Exclusion criteria**
Patient with penetrating injury (like stabbing & gunshot injuries).

**Methods**
On admission, all the patients were evaluated after necessary resuscitative measure, a quick detail history and thorough clinical examination was carried out to reach at a provisional diagnosis regarding nature of injury. Associated injuries were noted. “AMPLE” histories were taken which consists of

- A-Allergy
- M-Medication, including tetanous toxoid
- P-Past medical history
- L- Last meal.
- E- Events of the incidence

**Primary Survey**
Primary Survey was done and the patients was examined in the following manner.

- General physical examination
- Abdominal examination

**General Physical examination**
Particular attention was given to life supportive measures like airway breathing, ventilation and control of shock and hemorrhage.

- Pulse rate, blood pressure were taken at 15 minutes interval for one hour then hourly for six hours and then 2 hourly.
- Rate and mode of respiration were noted at intervals.
- Pallor, cyanosis and capillary refill at lip mucosa were noted.

**Abdominal examinations**
After thorough inspection of superficial thoacoabdominal injuries, abdomen was properly examined for signs of any internal injury like presence of abdominal guarding, rigidity, rebound tenderness and significant abdominal tenderness, obvious lump in peritoneal cavity. Abdominal distension, Kehr's sign, Ballance's sign, Gray Turner sign, Cullen sign, shifting dullness and absence of bowel sounds were elicited. Per rectal examination was done to exclude bleeding per rectum or any injury to distal part of colon.

All external injuries were managed accordingly. All patients were given tetanus toxoid, human anti-tetanus immunoglobulin and antibiotic in the ward.

**Resuscitation**
Along with the above examination the following resuscitative measures were taken simultaneously.

- Airway cleaning and maintenance of airway was done by putting oropharyngeal airway in mouth or endotracheal intubation if required.
- Wide bore intravenous cannula was inserted and rapid infusion of crystalloid done, after collecting a sample of blood for blood grouping and cross matching, hematocrit and Hb. In case of urgency blood transfusion was given.
- Inter-coastal chest tube was given in cases of associated hemothorax.
- Tracheostomy was performed in case of associated facial or laryngeal injury, when required.
- Nasogastric tube was given to decompress the stomach.
- Urethral catheterization was done to see for injury to urinary tract and to monitor urine output. But catheterization was not tried in those patients having urethral injury.

Secondary survey was done to see the other systemic injuries and for abdominal injuries which was missed in primary survey.
Investigations
Following investigations were done in all cases:
- Blood for hemoglobin, PCV, DC & TLC.
- Urine for routine and microscopic examination.
- Plain x-ray of chest and other parts for associated injuries.
- USG and CT abdomen were advised for stable and selected patients for favourable diagnosis and management.
- Abdominal paracentesis using medicatheter of 18 FR, either 4 quadrants or bilateral flank tap done, changing the position of the patient and assessment was done for presence of blood or enteric content inside peritoneal cavity. It has got better diagnostic value in acute emergency cases.
- Diagnostic peritoneal lavage using peritoneal dialysis catheter or 14 FR intracath and normal saline, was done under local anesthesia.

Non-clotted blood in aspiration confirms the presence of haemoperitoneum. The perfusate obtained was sent for laboratory analysis for RBC, WBC, Amylase, and Alkaline Phosphatase. Gram staining was done for presence of bacteria. It was tested or presence of enteric material and bile also.

Management
A - Conservative
During the admission process the following were prescribed: intravenous maintenance fluids, appropriate analgesia, a nil per oral regimen, and bed rest for a 'clinically appropriate' duration. The setting, i.e. a high-care/intensive care or ward environment, was dictated by the clinical and metabolic condition of the patient and by associated injuries, particularly intracranial pathology. The patient was monitored with regular & repeated assessment from a clinical and metabolic perspective, when needed laparotomy was done based on signs of peritonitis or hemodynamic instability.

B - Laparotomy
Laparotomy was done by mid line incision & and appropriate management as for the injury.

Observation and Discussion
The incidence of blunt trauma was 0.88% of all cases admitted in the surgery department.

Age: In this study it was seen that the age of the patient varied between 5 years to 75 years. The majority of cases (70%) were in the age group of 11-40 years and only 25% were in the age group above 40 years. Bag Well (1980) observed 56% cases in the 35-61 age group. The incidence observed in this series was comparable to the above series.

Sex: In our series, the Male and female cases were 87% and 13% respectively. In the study conducted by Canty TG (1999) and Davis (1976) the male preponderance was 80% & 82% respectively. From all these studies males predominated females because they were more exposed to outdoor activity with longer outdoor life in comparison to females. The finding is well marked among Indian females who usually confine themselves to the indoor.

Table – 1: Age & Sex Distribution (N=100)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male</th>
<th>Female</th>
<th>Total no. of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>03</td>
<td>02</td>
<td>05</td>
<td>5</td>
</tr>
<tr>
<td>11-20</td>
<td>16</td>
<td>02</td>
<td>18</td>
<td>18</td>
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<td>21-30</td>
<td>25</td>
<td>5</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>31-40</td>
<td>20</td>
<td>2</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>41-50</td>
<td>19</td>
<td>1</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>51-60</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>60 &amp; above</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>87</td>
<td>13</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
Spectrum of Blunt Trauma Abdomen

Majority of our patients (74%) sustained motor vehicle accident either as an occupant of vehicle or as a pedestrian, 14% due to fall from height, 7% due to blunt blow and 5% due to animal attack, two cases due to elephant attack. In the study of Ciftic et al (1998)\textsuperscript{19} and Davis\textsuperscript{18} automobile accidents were 60\% & 70\% respectively which is comparable with our results.
Clinical Manifestations

In our series, the clinical manifestations were abdominal pain & tenderness (78% and 70%) either with or without external bruise, scratch mark or skin erythema over the site of impact. This was closely followed by guarding and abdominal rigidity 65%, abdominal distention 45%, fewer number presented with pallor 34%, absent bowel sound 40%, vomiting 12%.

These were also the common findings in the series of Nwabrinke T et al\textsuperscript{20} with tenderness 69%, pain 52%, rigidity 25%, abdominal distension 48%, pallor 37%.

Associated Injuries: In this series the common associated injuries were chest injury (24%), head injury (20%) & pelvic injury (5%). Davis\textsuperscript{18} found in his series of 437 patients of blunt trauma abdomen, 27% cases were associated with chest injury & 9.2% patients with head injury. This is very much similar to our series.

Table II: Associated Injuries

<table>
<thead>
<tr>
<th>Associated injury</th>
<th>No. of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest injury</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Head injury</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Pelvis injury</td>
<td>05</td>
<td>05</td>
</tr>
<tr>
<td>Lower extremity bone injury</td>
<td>06</td>
<td>06</td>
</tr>
</tbody>
</table>

Ultrasonography and FAST

After initial resuscitation USG abdomen and pelvis/ FAST done in 80 patients depending upon the general condition of the patient. The commonest finding was free peritoneal fluid seen in 47 (58.75%) patients followed by splenic injury in 28 (35%) patients either in the stage of subcapsular hematoma or with splenic capsular tear or peri splenic collection. In splenic injuries USG missed 6 patients with grade I and 3 patients of grade II injuries. It detected all splenic grade III injuries. This revealed that USG abdomen has got poor sensitivity for detecting grade I and II splenic injuries.

There were 16 patients with liver injuries identified while it missed 4 cases with grade I injury and 1 case of grade II injury.

USG detected 03 patients with kidney injuries while missed one patient with grade I and one patient with grade II injuries. USG was unable to identify pancreatic injuries due to overlapping bowel and ongoing blood loss.

However USG abdomen is operator dependent but its clinical utility can't be challenged for determining further course, whether to go for further investigation or do direct exploratory laparotomy. FAST is helpful in the early decision point whether the patient needs immediate exploration to control bleeding. Those with a negative FAST are not at substantial risk for bleeding and can be evaluated in a less urgent fashion. The main pitfall of USG abdomen was its inability to determine nature of fluid, difficulty due to overlying bowel gas shadows, and adequately grade the solid viscus injury.

Our study showed that USG / FAST is a sensitive tool to detect haemoperitoneum. This suggests that in the absence of haemoperitoneum surgical intervention is not required. Brain IM et al\textsuperscript{21} studied 220 severely injured abdominal trauma cases and had USG abdomen with a sensitivity & specificity of 82.7% and 89% respectively.

Studies assessing the FAST technique for detecting haemoperitoneum report sensitivities from 63% to 98% and specificities above 90%. Localization of specific organ injuries by ultrasound is less successful, with sensitivities ranging from 44% to 73% for all combined organ injuries. Solid organ injuries, such as spleen and liver, are more accurately identified with ultrasound than bowel and mesentery injuries. Ultrasound has better sensitivity for detecting parenchymal spleen injuries than liver injuries. A negative ultrasound examination cannot completely rule out the possibility of intra abdominal injury.

CECT Abdomen

In our study CT scan was done in selected few cases where USG study was doubtful or to bring greater elaboration to the finding of USG. The main role of CT was to grade injuries in
haemodynamically stable patients so that the treatment options i.e. conservative or operative could be decided. CT also showed injuries missed by USG abdomen.

CT was done in 63 patients of whom most common organ injured was spleen (37 cases). 9 cases of splenic injuries were missed by USG abdomen. 29 were managed conservatively & 2 splenic injuries were managed subsequently by splenectomy, one due to associated mesenteric injury and other due to features of intraperitoneal hemorrhage.

CT also diagnosed 21 cases of liver injuries of which were missed by USG. 16 patients diagnosed by CT were managed conservatively. CT also diagnosed 5 cases of kidney injuries of which USG abdomen missed 2 injuries.

In our study no patients with hollow viscus injury was subjected to CT due to associated features of peritonitis, other organ injury. All the cases were diagnosed on laparotomy.

Multiple studies have demonstrated CT to have sensitivities and specificities consistently above 90%. Sensitivity of CECT to detect solid organ injuries is more than 97% while for hollow viscous it ranges from 64 to 90%. Yet another advantage is helical CT, which has significantly shorter scanning time. CT, while excellent at detecting solid-organ intra abdominal injury, is less accurate for bowel and mesentery injuries. Buzzas GR 199822 showed sensitivity of 79.5% & Specificity 99.3% for CECT abdomen in identifying blunt injuries to abdomen. Sensitivity improved with exclusion of hollow visceral injuries. Sensitivity between 92% and 97.6% and specificity as high as 98.7% have been reported in patients subjected to emergency CT scanning23,24. Most authors recommend admission and observation after a negative CT scan25,26. In a recent study of 2,774 patients, the authors concluded that the negative predictive value (99.63%) of CT scanning was sufficiently high to permit safe discharge of blunt trauma patients after a negative CT scan.27

**Visceral Involvement**

Spleen was the most common involved organ and accounted for 37% of cases, followed by liver (21%), mesentery, small intestine & bladder.

### Table III Visceral Involvement

<table>
<thead>
<tr>
<th>Organ</th>
<th>Present study (n=100)</th>
<th>Cox EF 1984 in n=870</th>
<th>Dais et al 1976 n=437</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spleen</td>
<td>37</td>
<td>42.6</td>
<td>20</td>
</tr>
<tr>
<td>Liver</td>
<td>21</td>
<td>35.6</td>
<td>29</td>
</tr>
<tr>
<td>Pancreas</td>
<td>02</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kidney</td>
<td>05</td>
<td>2.6</td>
<td>-</td>
</tr>
<tr>
<td>Small intestine</td>
<td>18</td>
<td>4.7</td>
<td>15</td>
</tr>
<tr>
<td>Stomach &amp; duodenum</td>
<td>02</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Large intestine</td>
<td>03</td>
<td>&lt;0.1</td>
<td>-</td>
</tr>
<tr>
<td>Mesentery</td>
<td>11</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>02</td>
<td>3.2</td>
<td>29</td>
</tr>
</tbody>
</table>

With the above comparison it is clear that the pattern of visceral injuries is similar to our study with a little variation.

**Management**

Out of 100 cases studied 64 (64%) cases were managed conservatively. With iv fluid, nasogastric aspiration, iv antibiotic, frequent Periodic physical examination for appearance of signs of peritoneal irritation like rigidity, absence of bowel sound and rebound tenderness. In 36 cases laparotomy was performed due to definite evidence of single or multiple organ injury. Early laparotomy was performed in 28 cases i.e within 12 hours. In the rest cases, laparotomy was conducted within 12 hour after where positive abdominal signs of visceral injuries appeared late as confirmed by USG study, CT scan or straight X ray abdomen. A total of 70 cases were selected for the conservative management, four splenic injury, two liver injury subsequently required laparotomy due to appearance of features of ongoing blood loss & peritonitis. More patients were subjected to operative treatment because of bowel & mesenteric injuries.
Table-10: Conservative Vis Operative

<table>
<thead>
<tr>
<th>Organ</th>
<th>Conservative</th>
<th>Operative</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spleen</td>
<td>29</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Liver</td>
<td>16</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Pancreas</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Kidney</td>
<td>05</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Small intestine</td>
<td>0</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Stomach &amp; duodenum</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Large intestine</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mesentery</td>
<td>3</td>
<td>08</td>
<td></td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>01</td>
<td>02</td>
<td></td>
</tr>
</tbody>
</table>

Spleen
James et al (1999), Cathey KL et al (1998) and many others advocated splenic salvage procedures to avoid complications like OPSI and immunological imbalance.
In our study 29 patients (74.28%) with splenic injuries were managed conservatively. S. P. Stawicki et al also showed that conservative management is possible in 80% of splenic injuries. The lower number is due to higher grade IV injuries and associated hollow viscus injury. Conservative management was possible in 100%, 73.68% & 64.% of grade I, II, & III splenic injuries respectively.

Table IV: Management of Splenic Injury

<table>
<thead>
<tr>
<th>Grade</th>
<th>Conservative</th>
<th>Operative</th>
<th>Total</th>
<th>% (consv./total *100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade I</td>
<td>8</td>
<td>-</td>
<td>8</td>
<td>100%</td>
</tr>
<tr>
<td>Grade II</td>
<td>14</td>
<td>2</td>
<td>16</td>
<td>87.5%</td>
</tr>
<tr>
<td>Grade III</td>
<td>6</td>
<td>3</td>
<td>9</td>
<td>66.6%</td>
</tr>
<tr>
<td>Grade IV &amp; V</td>
<td>4</td>
<td>4</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>9</td>
<td>37</td>
<td>75.67%</td>
</tr>
</tbody>
</table>

Liver
Many studies such as those by Richardson JD.(2008), Pachter HL et al(2000), Cuff RF et al(2000) have confirmed that 80-90% of all blunt liver injuries may be managed without laparotomy. In our study 76.16% of blunt liver injuries were managed conservatively which is consistent with the above series.
When patients with isolated liver injuries were analyzed, 91.5% of grade I and II injuries, 79% of grade III, 72.8% of grade 4, and 62.6% of grade 5 injuries were successfully managed without operative intervention. Therefore, even high-grade injuries have a high likelihood of successful nonoperative management.
S. P. Stawicki et al also showed that conservative management is possible in 80% of hepatic injuries.

Table V: Management of Liver Injury

<table>
<thead>
<tr>
<th>Grade</th>
<th>Conservative</th>
<th>Operative</th>
<th>Total</th>
<th>% (consv./total *100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade I</td>
<td>9</td>
<td>-</td>
<td>9</td>
<td>100%</td>
</tr>
<tr>
<td>Grade II</td>
<td>7</td>
<td>2</td>
<td>9</td>
<td>77.7%</td>
</tr>
<tr>
<td>Grade III</td>
<td>-</td>
<td>3</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>5</td>
<td>21</td>
<td>76.19%</td>
</tr>
</tbody>
</table>

Kidney
In a retrospective study comprised of 126 patients with blunt renal injury by Matthews LA et al, 90% were treated conservatively. In our study all the patients were treated conservatively with no morbidity or mortality. However conservative management of all the 5 patients was possible because they were associated with grade I and II injuries without any laceration or renal vascular injury.
In another review of 55 patients (95%) with blunt renal trauma by Goff et al, 69% of hemodynamically stable patients and 38% of hemodynamically unstable patients were successfully managed nonoperatively.

Pancreatic Injury
Only one case of pancreatic contusion was managed conservatively. However this patient developed pseudocyst of pancreas 6 weeks later which was also managed conservatively. This complication was acceptable compared to high mortality and morbidity associated with pancreatic surgery.

Urinary Bladder Injury
In a number of series, conservative, non operative management of blunt extra peritoneal bladder rupture has had a similar outcome to that of patients treated with primary suturing. In our study one patient with extra peritoneal bladder injury received conservative treatment in the form...
of catheter drainage and recovered well. Other two cases with intra peritoneal injury to bladder were repaired in two layer followed by insertion of indwelling catheter. Corriere JN Jr in their series managed 39 of 58 patients with extra peritoneal bladder injuries with catheter drainage alone. The author concluded that patients with extra peritoneal bladder ruptures may be treated with simple catheter drainage, if not requiring exploration for associated injuries. This is consistent with our study.

**Stomach & Duodenum**

There were 2 patients one each of stomach & duodenal injury. CECT could not identify injury to stomach. Both the injuries were detected intra operatively & repair done. There was no mortality in this group. Stomach & duodenal contusion can be managed conservatively provided they should be adequately diagnosed by CECT abdomen & perforation should be ruled out by oral contrast enhanced CT.

**Small Intestine**

There were 18 patients of small intestine varying from perforation to transaction of gut. Injuries were suspected on clinical and radiological grounds and were managed operatively. Bowel contusion can be managed conservatively provided they should be adequately diagnosed by CECT abdomen & perforation should be ruled out by oral contrast enhanced CT.

**Colon Injury**

In our study 03 Patients had colon injuries. Injuries were suspected on clinical and radiological grounds or positive DPL and were managed operatively. One patient died due to associated multiple organ injury & delay in performing operative intervention due to diagnostic dilemma.

**Mesenteric Injury**

Out of 11 patients with mesenteric injury, CT was done in 3 patients. One had mesenteric hematoma that was managed conservatively. Others had mesenteric laceration which were operated. The remaining 9 patients with mesenteric injury had positive paracentesis and had features of ongoing blood loss. Therefore these patients were managed operatively. 3 patients who had undergone laparotomy died due to associated pancreatic & splenic injuries.

**Morbidity & Mortality**

There was no mortality in group of patients which were managed conservatively. 4 patients died in the operative group. One due to associated head injury, one due to fecal peritonitis due to delayed hospitalization & 2 patients due to pancreatic head transaction.

The stay period in the hospital, managed conservatively ranged from 9-11 days compared to 14-20 days in operative group. There was lower incidence of pulmonary complication, early return of GI function, lower need of antibiotic prophylaxis. The patients were saved from the surgical trauma. Only one patient developed pseudopancreatic cyst and other with bladder injury developed clot retention in the conservative group.

**Conclusion**

Non operative management of blunt traumatic injuries is challenging. However, it can be quite satisfying to be able to successfully manage patients with severe and multiple traumatic injuries in non operative fashion. The advent of sophisticated imaging technologies and adjunctive minimally invasive techniques has somewhat lightened the trauma surgeon's operative burden. Despite that, more than ever, nothing surpasses the value of repeated clinical assessment by an experienced trauma surgeon, in guiding the ultimate therapeutic decisions. After all, the ultimate default pathway for severely injured trauma patients who failed non operative management is the operating theatre.
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