

## A Case Series of Delayed Laparoscopic Drainage of Haemoperitoneum in Blunt Liver Trauma

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### ABSTRACT

**Background:** Liver trauma is a leading cause of mortality in blunt abdomen trauma. Laparoscopy in blunt abdomen trauma has been described in the acute setting, however delayed laparoscopy as a tool of reevaluation of non operative management and drainage of haemoperitoneum in those with signs of inflammation, has not been widely evaluated. **Materials and Methods:** In this article, we retrospectively explore a series of 5 cases of blunt liver trauma presenting to our emergency department at CIVIL Hospital Ahmendabad, where delayed laparoscopic drainage was done. **Results and Conclusions:** Average of 1200 +/- 274 ml of haemoperitoneum was drained. Two out of 5 cases had bile staining of the drained collection. Mean operative duration was 40.8 +/- 7.6 mins. Post operative recovery was uneventful and all patients were doing well on review after two weeks. This throws light on delayed laparoscopic drainage being a safe and effective adjunct to non operative management of blunt liver trauma and avoids the trauma of emergency laparotomy.

**Keywords:** blunt liver trauma, laparoscopy, haemoperitoneum

### Introduction

Intra-abdominal injuries have been detected in about 12- 15 % of patients of blunt abdomen trauma<sup>1</sup>. Solid organ injuries are identified by multiple criteria including clinical assessment of haemodynamic stability, blood tests, radiological modalities including ultrasonography and when needed computed tomography<sup>2</sup>. With an incidence of 13.9 out of 100000 population, liver trauma is the leading cause of mortality in blunt abdomen trauma<sup>3</sup>. After liver, spleen is the most commonly injured solid organ<sup>4,5</sup>. The severity of liver injuries has been universally anatomically classified according to the american association for the surgery of trauma (AAST) grading scale and the more recent world society of emergency surgery (WSES) classification which takes into account the haemodynamic status and guides first line treatment<sup>6</sup>.

GRADE	DESCRIPTION
<b>I</b>	Hematoma: subcapsular, <10% surface area Laceration : capsular tear, <1cm depth
<b>II</b>	Hematoma : subcapsular, 10-50% surface area, intraparenchymal <10cm diameter
<b>III</b>	Hematoma: subcapsular, >50% surface area of ruptured subcapsular or parenchymal hematoma, intraparenchymal hematoma >10cm or expanding Laceration: >3cm parenchymal depth
<b>IV</b>	Laceration: parenchymal disruption involving 25-75% hepatic lobe or 1-3 Couinaud segments
<b>V</b>	Laceration: parenchymal disruption >75% hepatic lobe or >3 Couinaud segments within single lobe Vascular: juxtahepatic venous injuries (retrohepatic vena cava/ central major hepatic veins)
<b>VI</b>	Vascular: hepatic avulsion

\* Advance 1 grade for multiple injuries upto grade III

### Table 1: AAST Liver Injury Scale

There has been a gradual shift over the years towards non operative management (nom) being the preferred treatment of solid organ injuries, particularly liver trauma. A high success rate of nom has been suggested, with patient selection guided by injury severity and physiology<sup>7</sup>. This has led to decline in the number of exploratory laparotomy, primarily owing to the widespread use of imaging modalities that can identify lesions and guide conservative management<sup>8</sup>.Angioembolisation is performed as a minimally invasive procedure with a high success rate. However its availability is limited to high resource centres and has significant incidence of complications like hepatic necrosis<sup>9,10</sup>

Role of laparoscopy in the trauma setting has been described both as a diagnostic and therapeutic method. It is an excellent method to rule out associated injuries like mesenteric tears which may not be detected on radiology while also tackling liver trauma, or in cases of the uncertain abdomen. This is done in haemodynamic stable patients after initial resuscitation<sup>11</sup>.However delayed laparoscopy beyond the acute setting has not been widely described. As more liver injuries are being treated non-operatively, bile leak from a disrupted biliary tree presenting later has appeared as a new challenge<sup>12</sup>. Letoublon et al. Maintains that laparoscopic washings is to be considered on day 3 to 5 of all blunt liver trauma patients with a large haemoperitoneum or with features of inflammation like fever, leucocytosis, discomfort, tachycardia; as a part their nom rather than solely attribute it as a failure of nom<sup>13</sup>.

### Materials And Methods

In this study, we have done a retrospective descriptive analysis of 5 cases of liver injury with haemoperitoneum who presented to the emergency department of civil hospital ahmedabad, a tertiary care centre in india, and underwent delayed laparoscopic drainage of the haemoperitoneum. As per hospital protocol, solid organ injury and haemoperitoneum were first detected by ultrasonography and subsequently subjected to computed tomography.

### Case Details

#### Case 1

A 20-year-old female involved in a road traffic accident due to collision between two bikes presented in a hemodynamically stable condition with a AAST grade III liver trauma with right humerus fracture,for which casting was done by orthopedic department. Initially she was managed conservatively and 1 unit of packed cell blood transfusion was required. Three days following that, in

the setting of fever, tachycardia, tachypnea, she underwent laparoscopy and 1000ml of hemoperitoneum was drained and pelvic drain placement was done. Operative duration was 30 mins. On post-operative day 2 diet was started. On post-operative day 3 drain was removed and she was discharged on post-operative day 4 from our side and referred to orthopedic dept for further management of right humerus fracture. On follow up at two weeks she had no complain and performing well.

### **Case 2**

A 35-year-old male with history of fall from height presented with complain of upper abdominal pain, abdominal distension. On examination there was mild right hypochondriac area tenderness. CECT revealed AAST grade III liver trauma and AAST grade II splenic trauma. He was initially managed conservatively and 2 units of packed cell blood transfusion was done. On post-injury day 4, in view of persistent abdominal distension and respiratory discomfort, decision was taken to do diagnostic laparoscopy and intraoperatively 1500ml of bile stained hemoperitoneum was drained, no active bile leak or bleeding, laceration or any other significant findings were found. Operative duration was 45 mins. Postoperatively he was stable and shifted to ward. On post-operative day-2 diet was started. Drain was dry the next day and removed. He was discharged on post-operative day 4 without any complication with drain in situ. On review after 2 weeks, he was doing well.

### **Case 3**

A 30-year-old male with history of road traffic accident presented with tachycardia, tachypnea and bruise on right side of the abdomen. Investigation revealed right side haemothorax, for which intercostal drain placement was done and AAST grade III liver injury which was initially managed conservatively and 2 units of packed cell blood was transfused. On post admission day 4 in view of persistent fever and leucocytosis, he was taken for laparoscopy. Intraoperatively about 1500ml of collected blood was drained and pelvic drain was placed. There was no active bile leak or active bleeding or visible liver laceration. Operative duration was 37 mins. Postoperatively he was stable. On post-operative day 3 diet was started. Drain was removed on post-operative day 4 and intercostals chest drain was removed on post injury day 7. He was discharged at 8 days from admission. On follow-up, after two weeks he had no complaints and was doing well.

### **Case-4**

A 12 year old male with history of blunt abdominal trauma by bicycle handle sustaining injury to upper abdomen presented with complain of upper abdominal pain, bruise and abdominal distension. CECT revealed AAST grade III for both liver and splenic injury. Following initial resuscitation he was haemodynamically stable albeit deranged coagulation profile. Non operative management was commenced, which included 2 units packed cell transfusion and 4 units of fresh frozen plasma. Three days into admission coagulation profile normalized and he was posted electively for diagnostic laparoscopy and drainage. Intraoperatively about 1000ml of collected haemoperitoneum was drained. No active bleed or gross laceration noted in either liver or spleen and spleen was conserved. Pelvic drain placement was done. Operative duration was 50 mins. Postoperatively he was stable. Two days post operatively diet was started and drain was removed the day after. He was discharged on fifth post operative day without any complication. After 2 weeks on follow-up he had no complain. Repeat laboratory investigations were normal.

### **Case-5**

A 32 year old female with history of blunt abdominal trauma due to being kicked by buffalo presented in haemodynamically stable condition with complain of right upper abdominal pain and significant abdominal guarding. On further investigation, CECT revealed AAST grade IV liver injury with no active contrast leak. She was managed conservatively. Two packed cells were transfused. Over next 4 days she developed abdominal distension, constipation and dilated bowel loops on xray. So, decision was taken to do diagnostic laparoscopy. Intraoperatively, about 1000ml of bile stained hemoperitoneum was drained and there was no active bleeding or bile leak. Bowel walk and mesentery was normal. Pelvic drain was placed. Operative duration was 42 mins. Postoperative

recovery was good. On post-operative day 3 diet was started and on post-operative day 4 drain was removed. She was discharged on post operative day 5 without any complication. After 2 weeks on follow-up she had no complain and performing well.

## Results

Out of the patient demographics in this study, 1 person was in the <15 years age group while the rest lied in the 15-35 years age group. Male to female ratio is 1: 0.4 . Mechanism of injury was varied.

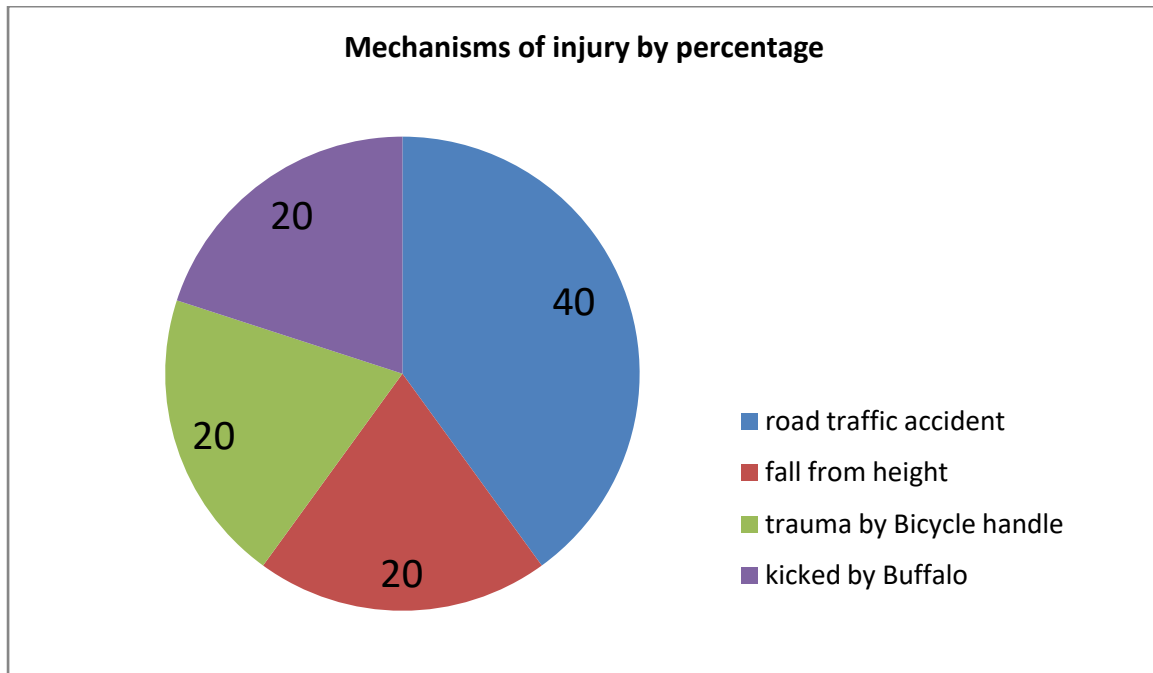


Figure 1: Mechanisms of injury by percentage of presentation in this case series

All patients were haemodynamically stable on arrival or upon initial resuscitation. All cases required blood transfusion. Non operative management was done with close monitoring. Decision for delayed laparoscopy was taken electively for case 4 where both AAST grade III liver and spleen injury was there in a 12 year old juvenile. All other decision of laparoscopy was in event of gross haemoperitoneum, abdominal distention or signs of inflammation.

The surgery was performed between post admission day 3 to 4 in all the cases. Average of 1200 +/- 274 ml of haemoperitoneum was drained. Two out of 5 cases had bile staining of the drained collection. Mean operative duration was 40.8 +/- 7.6 mins. Post operative recovery was uneventful with start of diet on day 3 and drain removal between day 3 to 4. No instance of persistent bile leakage was noted. No requirement of ICU stay was required in any case. No patient was subjected to repeat computed tomography. All were discharged between 7 to 10 days from admission. On review at two weeks, all patients were doing well, with no wound complications or otherwise.

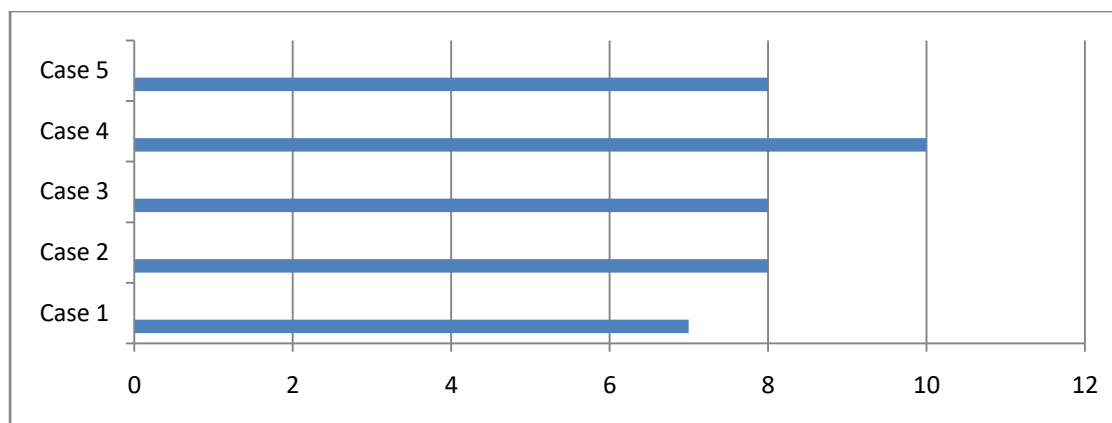


Figure 2: Length of hospital stay in days

### Discussion And Conclusion

Even with the advent of newer imaging modalities and a trend towards conservative management in blunt abdominal trauma, there is significant reports of negative laparotomy in the emergency setting<sup>14</sup>. emergency laparotomy in hepatic injury setting is less emphasized in current literature. When performed, perihepatic packing is the usual approach in the acute unstable patient and high mortality rates are noted in hepatic resections<sup>15</sup>.

Delayed laparoscopy allows reevaluation of blunt liver trauma patients being managed conservatively while avoiding the trauma of a full laparotomy. Even in those secondarily operated by laparoscopy, overall hospital stay is shortened, along with significant improvement in mortality and morbidity. laparoscopy is associated with shorter operative time, decreased requirement of intensive care stay and significantly less post operative complications including wound infections.<sup>16</sup>

In our study, repeat computed tomography was not done. Delayed laparoscopy being both diagnostic and therapeutic, may well avoid the need for repeat radiological modalities for re-evaluation. Abdominal guarding in conjunction with collected haemoperitoneum may work as tamponade to bleeding. No instance of persistent bile leak was noted in any of the cases, including high severity injuries like AAST grade IV in case 5, signifying minor biliary tree injuries even in severe liver trauma are amenable to conservative management. However, not much data is available in the arena of delayed laparoscopy in blunt liver trauma and large scale randomized control studies are wanting in this regard. In tune with other existing studies, our case series proved delayed laparoscopic drainage to be safe and effective in treatment of blunt liver trauma.

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