

Original Research Article

Conservative treatment of blunt hepatic trauma: my experience

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ABSTRACT

Background: Blunt hepatic trauma is common in abdominal injuries. In seventies different surgical procedures were evolved for operative treatment of liver injuries. In eighties the conservative treatment of liver injuries became the management of choice in hemodynamically stable patients. This study was conducted in patients of blunt hepatic trauma to assess the effectiveness of conservative treatment.

Methods: Two hundred patients with blunt hepatic trauma were included in this study. Clinical parameters, GCS and ISS were recorded in all the patients. FAST and CT scan were also done. Patients with unstable hemodynamics who responded to fluid challenge and with stable hemodynamics were included in conservative management of liver trauma.

Results: In this study 200 patients were analyzed, 30 patients were operated due to unstable hemodynamics while 170 patients treated conservatively. Average numbers of blood units transfused were 2-3 units and average hospital stay was 4-7 days. The patient recovery is to the extent of 97% with a few complications only.

Conclusions: The conservative treatment is safe option for blunt hepatic trauma patients in patients with stable hemodynamics. Intensive monitoring is essential as there may be failure in a few patients. The complication rate was minimum and no mortality.

Keywords: Blunt hepatic trauma, Liver injury, Conservative treatment, Non-operative treatment

INTRODUCTION

Solid viscera injuries particularly hepatic injuries are most common part of blunt abdominal trauma. The liver is although protected under the rib cage but is most likely to be injured in the blunt abdominal trauma because of its large size and fixation to diaphragm and spine. As the right lobe of liver is larger than left lobe, blunt trauma injuries are more common in right lobe. Motor vehicle accidents are the most common cause of blunt hepatic trauma. These high speed accidents produce tear of III-IV segments at the level of hepatic ligament mostly causing minor grade I-III tears.¹

Initially in seventies, these patients with blunt hepatic trauma were explored immediately irrespective of hemodynamics and associated hollow viscus injuries.² With the ultrasound, FAST (focused assessment by sonography of trauma) became a standard investigation for detection of hemoperitoneum in equivocal cases.³ The further introduction of contrast CT it was possible to classify liver injuries. Contrast enhanced computed tomography can categorise hepatic injuries as lacerations, contusion, subcapsular hematoma, parenchymal hematoma and hepatic fractures. Out of these hepatic lacerations are most common while subcapsular hematoma is least common. However CECT is very useful in detecting hilar injuries, hepatic vein injuries and follow up studies.³ Postoperative complications such as

liver abscess, subdiaphragmatic collection, subhepatic collection and biliomas can be detected on ultrasonography. In eighties and nineties conservative treatment of minor hepatic injuries became a standard regimen of treatment in hemodynamically stable patients.⁵

The surgical exploration in blunt hepatic trauma can prove to be futile as active bleeding stops in about 86% of patients.⁶ As the active bleeding from hepatic injury has stopped, these patients become hemodynamically stable. These patients respond positively to fluid challenge given for resuscitation. In these hemodynamically stable patients surgical exploration should be avoided and these patients can be treated safely by conservative or nonoperative regimen.⁷

Major blunt hepatic injuries with unstable hemodynamics or not responding to fluid challenge during resuscitation should be immediately explored. A few of these patients can be kept under observation. Extremely close observation in a critical care unit is essential as these patients may suddenly deteriorate and will require exploratory laparotomy. This close observation of severe hepatic blunt trauma should not be considered equivalent to conservative treatment. In case of continued bleeding such patient will require emergent exploratory laparotomy. The facilities and staff in operating room should be ready for emergency exploration. If this facility is not available round the clock patient may be transferred to apex trauma center.

Hepatic trauma patient can have complications to the extent of 20% irrespective of severity of injury and whether it was treated by nonoperative or operative treatment. The possible complications are hemobilia, liver abscess, A-V fistula, pseudo-aneurysm, bilioma formation and delayed rupture of liver.⁸

In last decade more complicated hepatic injuries detected on CECT are being by conservative method.⁹ For biliary injuries and complications endoscopic procedures are being used as a part of conservative treatment.¹⁰ The decision to treat a patient by conservative method depends on clinical parameters and hemodynamic stability and not on the severity of liver injury detected on CECT. Using these parameters more patient of blunt hepatic trauma are being treated by nonoperative regimen.¹¹ The goal of this study was analyze the safety and efficacy of conservative regimen in management of blunt hepatic trauma.

METHODS

This study was done in department of surgery in 200 adult patients. In all the patients admitted with blunt abdominal trauma or poly trauma a detailed history was taken regarding age, sex, duration and mechanism of injury. The examination of pulse rate, blood pressure sPo_2 and associated injuries was done. The calculation of

Glasgow Coma scale score (GCS) and injury severity score (ISS) was done at time of admission. All patients were examined by FAST. The presence of blood in peritoneum and hepatic trauma was the first criteria for inclusion in this study. The diagnostic peritoneal lavage (DPL) was not done any of the patients instead computerized tomography (CT scan) was done in most of the patients. Based on computed tomography and injury severity score, hepatic trauma was classified using the organ injury scale committee of American Association for the Surgery of Trauma Standards. Those patients having persistent hypotension systolic blood pressure less than 90 mm of Hg and tachycardia pulse rate more than 110 per minute were considered in hemorrhagic shock. The resuscitation was done using a fluid challenge of 20 ml/kg of body weight. If there was no response another 20 ml/kg of Ringer's lactate is infused in short period. If there was absent response or transient response to fluid challenge the patient was considered as hemodynamically unstable. These patients with unstable hemodynamics were subjected to operative treatment and excluded from further study. Those patients having not much tachycardia and hypotension and responding to fluid challenge of 20 ml/kg Ringer's lactate were labeled as hemodynamically stable. The pulse rate and blood pressure further settled. These patients with stable hemodynamics were included in this study and further analysis done. Abdominal ultrasonography (FAST) was done in all patients and hemoperitoneum was graded as mild, moderate and large. Abdominal computed tomography was done in majority of these patients and grading of injury was done. As the FAST and CECT were not uniformly done, the basic criterion for selection of patients for conservative treatment of blunt hepatic trauma was hemodynamic stability. The patients who were selected for conservative management were kept under observation. The observation regarding peritoneal signs was continuously done by surgery residents even if the patient was kept in a critical care unit. Timely review was done by consultant into progress of patient. The termination of observation period and operative decision was always taken by consultant. The hematocrit values and other haematological tests were done daily. The observations were made regarding number of blood transfusions. The progress of conservative treatment was done by ultrasound even during follow up visits. Follow up CT could be done even in outpatient department if some complication is suspected. The length of hospital stay was also recorded. All these observations were recorded in patients' record and analyzed.

RESULTS

In this study of 200 patients, 160 were males and 40 were females. The age of these patients ranged from 20 to 64 years of age. The motor vehicle accident in 164 (82%), pedestrian hit in 9 (4.5%), buried under wall collapse 4 (2%), fall from height or stairs 8 (4%) and assault 10 (5%) and others 5 (2.5%). Six patients with massive hemoperitoneum diagnosed by abdominal paracentesis

and 24 patients with unstable hemodynamics with a total of 30 patients were subjected to operative treatment. The operative procedures included suturing, omental packing and perihepatic packing. Rests of 170 patients were placed on conservative treatment and were included in the study for further analysis. The clinical parameters at time of admission are given in Table 1. The ultrasound or FAST could detect hemoperitoneum which could be graded as mild in 75 (60.59%), moderate in 58 (34.11%) and large in 9 (5.30%). The CT findings could grade the liver injury in these patients; grade I in 75 (44.12%), grade II in 51 (30.00%), grade III in 33 (19.41%) and grade IV in 11 (11.67%) patients. The associated chest injuries were most common followed by head injury. Other intra-abdominal associated injuries were spleen, hollow viscera, retroperitoneal and pelvic injuries in polytrauma patients. The simultaneous management of these associated injuries also affects the hemodynamics of these patients. The failure of conservative treatment occurred in 5 (3.0%) patients and had to explore. The infective complication liver abscess occurred in one patient, bilioma in one patient and hemobilia in none. The hospital stay was 3 to 7 days. There was no mortality in patients who were treated conservatively.

Table 1: Clinical parameters in blunt hepatic trauma.

Clinical parameters (conservative treatment)	N (170)
Age (years)	42
Sex (Male/female)	4:1
Systolic blood pressure mm Hg	108
Glassgow Comma scale score	8-15
Numbers of blood units transfused	2
Injury severity score	23
Hospital stay in days	3-7
Complications/morbidity	2%

DISCUSSION

In the blunt abdominal trauma patients, liver injuries are most common. Most of the patients involved in motor vehicle accidents are young patients. With the description of Pringle's manoeuvre in 1908 there was a boost in surgical repairs of the hepatic trauma.¹² More techniques were introduced for surgical repair of hepatic trauma. Girgin S et al evaluated various surgical methods in blunt liver trauma patients. In a retrospective study of 159 patients, simple suturing was done in minor liver injuries with grade I and II. In patients with severe grade III to V liver injuries, deep mattress suturing, debridement, selective hepatic artery ligation, omental packing of liver laceration, resectional debridement with direct control of bleeding vessels using Pringle's manoeuvre and perihepatic packing was done. The mortality rate in both minor and major liver injuries was 21.3%.¹³ Recently hemostatic biological agents has been used to achieve haemostasis and prevent biliary leak in blunt hepatic injuries.¹⁴ Arseno et al in aggressive management of

complex hepatic injuries of grade IV and V surgical procedures like sponge packing, angiographic embolization, ERCP, stenting of biliary ducts in bile leakage and drainage of bilioma and hepatic abscess. Using these procedures, decreased mortality rate can be achieved.¹⁵ Polanco P et al found that in complex hepatic injuries, hepatic resection should be done may be as initial or delayed surgical option as this is associated with low morbidity and mortality.¹⁶

During exploratory laparotomy for blunt abdominal trauma, it was observed that solid viscera injuries like liver and spleen were not bleeding actively. These observations led to concept of conservative management of liver injuries. In eighties and nineties of last century there was a sudden shift from operative to nonoperative management.¹⁷ The nonoperative method of treating blunt hepatic injuries became the method of choice with good recovery rate, low morbidity and mortality. These studies were based on the selection criteria of stable hemodynamics with recovery rate up to 95% in both children and adults.¹⁸ The decision to operative treatment or conservative treatment is based on clinical parameters of hemodynamic stability and response to fluid challenge. The initial fluid challenge of 20 ml/kg of crystalloid solution can be followed by another 20 ml/kg of Ringer lactate; if the hemodynamics of the patient becomes stable the patient can be observed and conservative treatment of isolated blunt hepatic trauma can be considered.¹⁹

A good outcome of blunt hepatic trauma can be expected by rapid diagnosis using FAST and CT scan. The FAST can diagnose hemoperitoneum at time of admission and has been used as a triage procedure in mass casualties.²⁰ CT scan can also be used as a hospital triage tool in patients with blunt abdominal trauma to classify patients for operative and nonoperative treatment.²¹ However this decision is based on clinical parameters of hemodynamic stability. A follow up CT can detect healing of hepatic injuries and postoperative complications.

Min Li et al in a series of 81 patients, 9 patients with grade IV-V hepatic trauma were explored due to hemodynamic instability while 72 patients with grade I-V hepatic injury who were hemodynamically stable were treated with nonoperative management. The success rate of nonoperative management was 97.2%; in grade I-III, IV and V success rates were 100%, 94.4% and 83.3% respectively. The complication rate in nonoperative group was 10% while 45.5% in operative group. There was no mortality in nonoperative group. They concluded that nonoperative management should be the first option in hepatic trauma in hemodynamically stable patients. The liver injury grade and volume of hemoperitoneum should not be the criteria for selection of patients in nonoperative group.

Ochsner MG reviewed the literature for management of hepatic and splenic injuries and inferred that 67% of

explorations are non-therapeutic. The conservative management of these blunt injuries is a good alternative in patients with hemodynamic stability. The predictors of failure of conservative treatment include hemodynamic instability, hepatic injuries of grade IV-V and contrast pooling on CECT.²²

In this study 170 patients with blunt hepatic trauma selected on basis of stable hemodynamics were treated by conservative method. The males outnumbered the females. Majority of patients were in third and fourth decade. Motor vehicle accident was the most common cause of liver injuries. Those patients with low systolic blood pressure were given fluid challenge and if they had stable hemodynamics; they were included in conservative method of treatment. The associated injuries to other viscera can change the hemodynamics of the patients at admission. A strict observation and monitoring of clinical parameters is essential to treat blunt hepatic trauma in a conservative method. The failure rate of conservative treatment of blunt hepatic trauma in this study is 2.94%. Out of 170 patients, in 5 patients conservative treatment had to be terminated due fall in haemoglobin level despite blood transfusions. The complication rate is very low in our series and there is no mortality. In an extensive review was critical of over enthusiastic nonoperative approach. He believed that complications after nonoperative treatment were not acceptable as in literature.²³ In a retrospective study of 348 patients with severe hepatic trauma, majority of these were treated by surgical procedures (74.4%). The severe hepatic injuries grades IV-V usually require surgical intervention. The failure rate of nonoperative management was 17.2%.²⁴

Hammes et al in management of 134 of blunt liver trauma patients, 35 (26%) patients with unstable hemodynamics were explored immediately. The remaining 99 (74%) patients were treated by nonoperative management. Five patients were subjected to delayed exploratory laparotomy. Liver related complications were seen in seven patients. Nonoperative is not affected by presence of shock, grade of liver injury or associated intra-abdominal injuries. The success rate of 95% is achieved in this group of nonoperative management.²⁵

The conservative treatment is safe option for blunt hepatic trauma patients in patients with stable hemodynamics. The selection of these patients is very important and should be based on hemodynamics alone rather than grading of hepatic injury on CT scan. Intensive monitoring is essential as there may be failure in a few patients. The patient recovery is to the extent of 97% with a few complications only.

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