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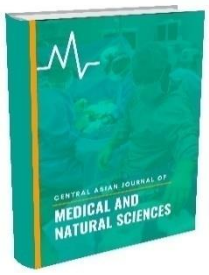

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Conservative Management in Blunt Liver Injury in Aldiwaniyah Teaching Hospital

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Abstract: Background: Blunt hepatic trauma is common in abdominal injuries. This study was conducted in those patients of blunt liver trauma to assess the effectiveness of conservative treatment.

Methods: fifty patients with blunt hepatic trauma were included in this study. Clinical assessment was done 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 50 patients were analyzed, 5 patients were operated due to unstable hemodynamics while 45 patients treated conservatively. Average numbers of blood units transfused were 2-3 units and average hospital stay was 3-6 days.

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.

Key words: hepatic trauma, management, patients.

INTRODUCTION

The incidence of liver injury may reach approximately 5 % of patients whom received in emergency department all over the world. The anatomical position of the liver in addition to its size making it more vulnerable to be more frequent solid organ injury in trauma. [1] There is great development in the management of hepatic trauma mainly in the last two decades, this advancement

occur by the new technique in diagnosis and treatment options. Till now there is a great argument about more severe liver shuttered injuries and biliary trauma which facing trauma surgeon. Cases that can be managed non operatively may reach more than 85 % of liver injuries in the United States .[2]

Selective non-operative management (SNOM) of both adult and pediatric patients with solid-organ injury from blunt abdominal trauma is now well established and are based on the widespread use of CT in stable patients. Patients managed non operatively have more risk for rapid deterioration. As a consequence, they must be monitored in advanced care unit by close follow up for his hemodynamic status, fluid requirement and if need for blood transfusion, where signs of early deterioration can be detected and surgical intervention undertaken rapidly if required.[1] A patient with a history of shock at the scene after blunt trauma should be suspected of having a major liver injury. Hemodynamically unstable patients, those with altered mental status, or those that will undergo general anesthesia for extraabdominal procedures should be evaluated with diagnostic peritoneal lavage. However, stable patients without peritoneal signs are better evaluated by CT due to the possibility of nonoperative treatment and injury severity grading.[2]

Inspite the anatomical position of the liver in the right hypochondrium with protection that come from thoracic cage and its fixation into diaphragm, the hepatic trauma are the most common type of abdominal trauma. [3] As the right lobe of liver is larger than left lobe, blunt trauma injuries are more common in right lobe. The liver is highly vascularized organ, and blood loss is the early and more serious complication of hepatic trauma.[7].The factors that classically deepened on to start conservative treatment in liver injury include the hemodynamic status which should be stable and well controlled, conscious level and orientation of the patient, no serious and clear indication for laparotomy like signs of acute peritonitis, grading of liver injury (grade 1 to 3), and blood transfusion not more than two units. [5,6]Recently the introduce of angiographic embolization as anew measure in the protocol of nonoperative treatment in cases of liver injuries and this will help in decrease the need for blood transfusions ,improve quality of conservative treatment and may also decrease the number of operations.[8]

The patients that are stable regarding clinical status and on examination show no any peritoneal signs, those are best to be monitored continuously by ultrasound, vital signs, blood gases and, when there is any suspicions or abnormalities are detected, a CT scan examination may be need and is better to do it with contrast.[9] 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 monitoring 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. [10, 20]

Blunt hepatic trauma mechanism may include compression, drag over, and direct force. The arterial blood vessels characterized by elastic tissue within so they are the least structure to be injured within liver. Venous and biliary ductal tissues have the next resistance in liver parenchyma while liver tissue is the least.[11]

Direct trauma thus results in damage in liver tissue along segmental and or horizontal fissures in form of fractures this may cause tearing in hepatic veins or portal. [12]Similarly. the small branches from the caudate lobe entering directly into the cava are at high risk for shear, and thus a linear tear appears

on the anterior caval surface. Direct compressive forces usually cause tearing between segmental fissures in an anteroposterior sagittal orientation. Horizontal fracture lines into the parenchyma give the characteristic burst pattern to such liver injuries. [13]These usually underlie the ribs and costal cartilage. Fracture lines that are parallel haw been dubbed bear claw-type injuries. Knowing the mechanism of injury articulated by the paramedics allows the surgeon to anticipate certain patterns of injury.[18]

Compressive forces caused by the steering wheel or the shoulder belt of a three-point restraint system can result in extensive bear clawtype injuries to the liver and even transections of the liver. The abrupt deceleration tends to tear the "relatively• heavy .Liver from its attachments, such as hepatic veins, veins from the caudate lobe, and lacerations into parenchyma at the ligamentum teres. which are often associated with exsanguinating hemorrhage.[22] Indications for non-operative management of solid organ injury include: 1-Appropriate injuries (grades I–III) of solid organs on computed tomography 2-Minimal physical signs 3-Cardiovascular stability with a requirement of less than 2 units of blood acutely 4-High dependency or intensive care facilities available 5-Patient available for repeated examination.[17] The complication of non operative treatment of blunt hepatic trauma may include the development of partial arterial wall injury causing a false aneurysm ,this may be ruptured into adjacent biliary tree branch in gradual manner this will result in the development of hemobilia.The clinical picture that increase suspicion of hemobilia include sudden onset of upper gastrointestinal bleeding within a week of liver injury, this also associated with jaundice, abdominal pain which colicky in nature that occurs due to accumulation of blood clots within biliary tree that will pass into the duodenum through ampulla of Vater. When there is area of liver showing devascularization this will causing necrotic and dead tissue. When these areas are small causing little effect that not need treatment while the large necrotic areas may result in liver abscess.one of the serious and highly risky complication of conservative management is missed hollow viscus injury which is devastating complication and life threatening. Other complications may include : biliary peritonitis, ascites from bile leaks, bleeding within peritoneal cavity, increase intraabdominal pressure due to abdominal compartment syndrome, and delayed hemorrhage.[24]

Patients and methods

In this retrospective study patients were admitted to our emergency department in AL-DEWANYIA teaching hospital with blunt abdominal trauma between May 2014 and December 2016 .They were screened using radiological study that show liver injury. The exclusion criteria include those with unstable hemodynamically , low CGS that indicate conscious abnormality, penetrating injuries, age below 15 years, and those in need for urgent surgical or any invasive procedure. In all the patients admitted with blunt abdominal trauma or poly trauma a detailed history was taken regarding age, gender, and duration and injury mechanism. The examination of pulse rate, blood pressure sPo2 and associated injuries was done. All patients were examined by FAST. The presence of blood in peritoneum and hepatic trauma was the first criteria for inclusion in this study. Computerized tomography (CT scan) was done in most of the patients. Based on computed tomography and injury severity score, we classified hepatic trauma the organ injury scale committee of American Association for the Surgery of Trauma Standards. Those patients having not much tachycardia and hypotension and responding to fluid challenge of Ringer's lactate were labeled as hemodynamically stable.

RESULTS

In this study of 50 patients, 30 were males and 20 were females. The age of these patients ranged from 20 to 55 years of age. The road traffic accident in 20 (40%),, fall from height or stairs 10 (20%) , assault(direct blunt trauma) 7 (14%),wall collapse in 6(12%) and others7 (14%). The clinical parameters at time of admission are given in **Table 1**. The ultrasound or FAST could detect hemoperitoneum. The CT findings could grade the liver injury in these patients; grade I in 30 (60%), grade II in 15 (30%), grade III in 5 (10%) . The associated chest injuries were most common followed by head injury,both of them not need for surgical intervention. Other injuries include pelvic injuries in polytrauma patients and retroperitoneal . The simultaneous management of these associated injuries also affects the hemodynamics of these patients. The failure of conservative treatment occurred in 5 (10%) patients and had to explore. The infective complication liver abscess occurred in one patient, bilioma in one patient and hemobilia in one patient. The hospital stay was 3 to 6 days. There was no mortality in patients who were treated conservatively.

Table 1 clinical parameters

Clinical parameters (conservative treatment)	N (50)
Age (years)	37
gender (Male/female)	2:1
blood pressure(systolic) mm Hg	110
Glassgow Comma scale score	8-15
Numbers of blood units transfused	2
Hospital stay in days	3-7
Complications/morbidity	6%

Table 2 grades of liver injury

Grade	Injury Description
I Hematoma **Laceration**	Subcapsular hematoma, <10% surface area Capsular tear,, <1 cm depth
II Hematoma **Laceration**	Subcapsular, nonexpanding, 10%–50% surface area Intraparenchymal, <10 cm diameter depth, <10 cm
III Hematoma **Laceration**	Subcapsular, >50% surface area or expanding; hematoma >10 cm or expanding >3 cm parenchymal depth

IV Hematoma Laceration	Ruptured intraparenchymal hematoma Parenchymal damage 25%–75% of hepatic lobe or 1–3 segments within a same lobe
V Laceration Vascular	Parenchymal destruction >75% of hepatic lobe or >3 segments within one lobe. hepatic venous injuries (i.e., retrohepatic vena cava/central major hepatic veins
VI Vascular	Hepatic avulsion

Table 3 causes of liver trauma

cause	No.	%
RTA	20	40%
Fall from height	10	20%
Assult(direct trauma)	7	14%
Wall collapse	6	12%
others	7	14%

Table 4 complications of hepatic injury

complication	No.	%
Liver abcess	1	2%
biloma	1	2%
hemobilia	1	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.[2] the role of ct scan is great in the progression of nonoperative liver trauma management by the aid in detailed anatomy of liver tissue and vasculature that help in precise definition of grade of injury. [3]The first introduction of conservative management in solid organ trauma was in pediatric splenic injury (Aronson et al, 1977) and then applied with high success rate in pediatric hepatic (Karp et al, 1983) and these good results make it successfully applicable in liver and spleen trauma in adult patients (Meyer et al, 1985).[4] From the beginning of 1990s, conservative liver blunt trauma management became a standard mainly on those

patients with stable hemodynamic status (Stein & Scalea, 2006). This progression in conservative treatment should also be associated with advancement in monitoring of those cases in well occupied intensive care units with well trained staff. [4] In patients with high grade hepatic trauma (grade III and above) ,they must be admitted in well prepared intensive care unit and close monitoring of those patients should include hemodynamic status, blood gases with frequent abdominal examination and serial ultrasound studies. Abdominal examination is very important in detect any recent tenderness or if there any enlargement in liver size these findings may indicate development of bleeding within liver parenchyma. [5]The admission time in the ICU will depend on patient status and grade of liver injury. For those patients in whom there is only liver trauma and show good response to nonoperative treatment and remain stable for at least 48 hours ,they can be transferred into surgical ward then they can be discharged home within 5-7 days. Some investigations can done for monitoring patients status like bleeding profile, complete blood pictures and liver function. [6]

More recent studies now show that most patients with grade I and ll injuries can be managed nonoperatiwly. And patients with grade 111. IV; and V injuries will require operation in 50% to 75% of the cases The decision to operative treatment or conservative treatment is based on clinical parameters of hemodynamic stability and response to fluid challenge.[7,8] The initial fluid challenge of 15 ml/kg of crystalloid fluids therapy 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.[9] 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] The use of angiography becomes highly popular in some trauma centers. CT scan with intravenous contrast study also has good role in diagnosis of liver injury, a ,,blush,, of contrast material mean that there is arterial liver injury(i.e active extravasation) .

This extravasation of contrast regarding as indication for angiography as confirm diagnosis in addition to embolization of injured vessel by selective angiography and this will lead to avoid development of pseudoaneurysm and decrease risk of delayed hemorrhage.[13] CT with contrast that showing extravasation is the only indication for using selective angiography. Studies show that angiography now can be used in cases of high grade liver injury with successful results even without using CT scan with contrast ,segmental or lobar vessels injury may be found without clear blush, and if this remain undetected may later on cause delayed hemorrhage.[14]

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.

None operative treatment has many benefit that make it more popular now aday,these include low risk associated with exploratory laparotomy that associated with high complication rate, less hospital stay and this will eventually decrease coast, decrease the expected intraabdominal complications and decrease the need for more blood transfusion. [17]

Tinkoff et al.4 showed that 86.3% of liver injuries can be dealt with nonoperatively (2008). A study by Pachter and colleagues included 25 patients with grades I to III injuries all of them treated conservatively. [8]

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.[25] 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.

In our study five pateints of 50 were explored due to hemodynamic instability (10%).and success rate of none operative management in grade l-lll was 90%).

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.[23] Five patients were subjected to delayed exploratory laparotomy.in our study five patient were shown failure of conservative management due to hemodynamic instability one of them grade l ,one grade ll while the other two were grade lll.[17]

Conclusion

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. Conservative treatment of blunt hepatic trauma indicated only in vitally stable patient with absence of any signs of peritonitis or other organ injury and in need for well trained team with availability of close monitoring environment ,serial CT scan follow up and facilities for urgent laparotomy.

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