



CLINICAL STUDY OF LIVER TRAUMA MANAGED CONSERVATIVELY IN EMERGENCY AND TRAUMA CARE UNIT

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KEYWORDS :

CASE HISTORY:

Three young male patients A,B and C aged 18,17 and 16 years respectively, with a history of RTA with blunt trauma abdomen and chest were brought to emergency department referred from civil hospital in view of liver trauma and hemoperitoneum. Patients came with chief complaints of pain in abdomen and backache since 2 days, immediately following RTA. No other complaints of cardiorespiratory or central nervous system involvement. On admission, patient A was conscious, oriented with time, place and person, afebrile with P- 86/min, bp- 90/50 mm of hg, RR-22/min, spo2- 98% on pulse oximeter, P/A- tenderness present in epigastric region, rest abdomen soft, no guarding, no rigidity, bowel sounds +, CVS/RS/CNS-WNL. Patient B was conscious, oriented with time, place and person, afebrile with P- 88/min, bp- 100/50 mm of hg, RR-20/min, spo2- 99% on pulse oximeter, P/A- tenderness present in epigastric region, rest abdomen soft, no guarding, no rigidity, bowel sounds +, CVS/RS/CNS-WNL. Patient C was conscious, oriented with time, place and person, afebrile with P- 94/min, bp-90/50 mm of hg, RR-18/min, spo2- 98% on pulse oximeter, P/A- tenderness present in epigastric region, rest abdomen soft, no guarding, no rigidity, bowel sounds +, pelvic compression test was positive suggestive of pelvic injury, CVS/RS/CNS-WNL. All patients were immediately attended, resuscitated and stabilized. All routine investigations done. Patient A,B and C hemoglobin were 8.2 gm%, 8.6 gm% and 9.6 gm% respectively. All patients were transfused immediately. Urgent USG of all patients done suggestive of liver contusions and mild ascites. Also CECT scan of abdomen of both patients done suggestive of liver lacerations(25-75% area) and parenchyma hematomas, findings suggestive of grade IV liver injury according to AAST scale, moderate free fluid in perihepatic, perisplenic, paracolic gutters and pelvis suggestive of hemoperitoneum. After complete evaluation of both patients, decision regarding conservative management of the patients was taken inspite of grade IV liver injury.

INTRODUCTION:

The incidence of liver injury is continuously rising due to increase in the incidence of road traffic accidents usually as a part of poly-trauma. Mortality of liver trauma has considerably decreased due to improvement in the diagnostic and therapeutic strategy of such patients with current mortality fluctuating around 10% depending upon type and grade of injury. Over the last several decades, non-operative management (NOM) of blunt hepatic injuries has been demonstrated, in selective patients, to be both safe and highly successful. Many studies have confirmed that 80–90% of all blunt liver injuries may be managed without laparotomy. From the 1990s onwards in the emergency room of trauma centers, before a CT evaluation, surgeons or emergency physicians have routinely been performing focused assessment sonography for trauma (FAST) in the recognition of the presence of intra-abdominal free fluid. The

selection of further appropriate imaging studies, after initial and indispensable CT evaluation, may be institution or physician specific, as expert interpretation is, perhaps, the most important factor in deciding which imaging study to employ. The appropriate approach should be determined by local resources, expertise, clinical conditions, and, furthermore, by instrumental location. Restriction of physical activities has been recommended by several authorities in an attempt to prevent complications. There are numerous unresolved questions about liver non-operative management (NOM), in particular “in the role of follow-up scans.” Keeping in view the underlying trauma of a soft organ, it seems logical to restrict strenuous activity for 5–6 months, even though the recommendation is not supported by any sound clinical date”. So it becomes imperative to emphasize on young people to avoid any strenuous work for at least 5–6 months who invariably are impatient to resume their strenuous physical activity. This common recommendation is given in order to safeguard them against re-injury, which might, arguably, have a higher failure rate with NOM. The initial report on conservative management of blunt liver injury in four pediatric patients was published in 1972 by Richie[1] and others. Since then several other published studies have supported this approach, which has become the treatment of choice for stable patients of all ages with blunt liver injury.

Criteria for selecting a patient for non-operative management of liver injury are:

Protocol of nonoperative management in AAST-OIS grade IV blunt hepatic trauma - Division of Trauma Surgery - University of Campinas

Criteria for patient selection:

- 1- Abdominal blunt trauma
- 2- Hemodynamic stability after initial resuscitation with no need for blood:
 - a. Systemic blood pressure > 90 mmHg
 - b. Initial hemoglobin level > 8
- 3- Evaluation by Computed Tomography with:
 - a. Absence of associated injuries on hollow viscus and pneumoperitoneum
 - b. Absence of contrast blush (evidence of active arterial bleeding is indication for angiography and embolization)
- 4- Clinical evaluation with no signs of peritonitis

Monitoring of patients undergoing nonoperative management:

- 1- Hemoglobin/ Hematocrit measurement every 6 hours or more frequently if any clinical deterioration
- 2- ABG measurements every 6 hours or more frequently if any clinical deterioration
- 3- ICU (Intensive Care Unit)

Criteria for failure of nonoperative management:

- 1- Need for surgical intervention determined by:
 - a. Hemodynamic instability
 - b. Failure of angioembolization to control active bleeding
 - c. Progressive fall of hemoglobin/ hematocrit levels with recurrent blood transfusion
 - d. Clinical signs of peritonitis

The WSES Classification divides Hepatic Injuries into three classes:

- Minor (WSES grade I).
- Moderate (WSES grade II).
- Severe (WSES grade III and IV).

The classification considers either the AAST classification either the hemodynamic status and the associated lesions

WSES Liver Trauma Classification

	WSES grade	Blunt/ Penetrating (Stab / Guns)	AAST	Haemodynamic	CT-scan	First-line Treatment
MINOR	WSES grade I	B/P SW/GSW	I-II	Stable	Yes + Local Exploration in SW#	NOM* + Serial Clinical/Laboratory/Radiological Evaluation
MODERATE	WSES grade II	B/P SW/GSW	III	Stable		
SEVERE	WSES grade III	B/P SW/GSW	IV-V	Stable		
	WSES grade IV	B/P SW/GSW	I-VI	Unstable	No	OM

(SW Stab Wound, GSW Gun Shot Wound; OM: Operative Management; NOM: Non Operative Management; *NOM should only be attempted in centers capable of a precise diagnosis of the severity of liver injuries and capable of intensive management (close clinical observation and haemodynamic monitoring in a high dependency/intensive care environment, including serial clinical examination and laboratory assay, with immediate access to diagnostics, interventional radiology and surgery and immediately available access to blood and blood products; # wound exploration near the inferior costal margin should be avoided if not strictly necessary because of the high risk to damage the intercostal vessels)

Minor hepatic injuries:

- WSES grade I includes AAST grade I-II hemodynamically stable either blunt or penetrating lesions.

Moderate hepatic injuries:

- WSES grade II includes AAST grade III hemodynamically stable either blunt or penetrating lesions.

Severe hepatic injuries:

- WSES grade III includes AAST grade IV-VI hemodynamically stable either blunt or penetrating lesions.

WSES grade IV includes AAST grade I-VI hemodynamically unstable either blunt or penetrating lesions.

- AAST Liver Trauma Classification

Grade	Injury type	Injury description
I	Haematoma	Subcapsular <10 % surface
	Laceration	Capsular tear <1 cm parenchymal depth
II	Haematoma	Subcapsular 10–50 % surface area; intraparenchymal, <10 cm diameter
	Laceration	1–3 cm parenchymal depth, <10 cm in length
III	Haematoma	Subcapsular >50 % surface area or expanding, ruptured subcapsular or parenchymal haematoma. Intraparenchymal haematoma >10 cm
	Laceration	>3 cm parenchymal depth

IV	Laceration	Parenchymal disruption 25–75 % of hepatic lobe
	Vascular	Juxtavenous hepatic injuries i.e. retrohepatic vena cava/centrl major hepatic veins
VI	Vascular	Hepatic avulsion

DISCUSSION:

There has been a significant shift from operative to non-operative management of liver injuries in the past two decades. This significant shift towards non-operative management was because of high precision of diagnostic algorithm given by ultrasonography, computed tomography, angiography (CTA, MRA).[2,3] As a result of these diagnostic modalities and availability of critical care units, management of liver injuries has shifted from operative to non-operative means. We favored conservative management in these patients as they were hemodynamically stable with no peritoneal signs, no other associated abdominal injury requiring laparotomy.

It required great efforts for our surgical team. Our surgical team kept a strict monitoring of vitals, intake output, abdominal girth and watch on peritoneal signs of these patients. After initial resuscitation, when both patients were stabilized vitally, patients blood reports were monitored for altered liver functions and hemoglobin on daily basis which showed no fall in hemoglobin of patients and normal liver functions upto 7 days. Also frequent usg and CT were done to monitor the liver laceration status and free fluid in abdomen. Repeat usg done after 7 days suggestive of resolving lacerations and contusion and subcapsular hematoma of liver. Day 14 CECT abdomen suggestive of downgrading of liver injury from AAST grade IV to grade III and significant decrease in free fluid. Over the course of time, patient was vitally stable and his abdominal pain and tenderness subsided and patient was discharged on full diet, passing stools and flatus, and with no complaints.

Laparotomy is indicated in patients with hemodynamic instability with signs of massive bleeding into peritoneal cavity and patients with other intra-abdominal organ injury requiring laparotomy.

Amroch *et al.* described 13 children with blunt liver injuries managed non-operatively who had follow-up US and/or CT every 24 h until stabilization.[4] The most appropriate time for documenting the resolution of liver injuries with CT in children has been suggested to be 3 months for mild injuries, 3–6 months for moderate injuries, and 9 months for the most severe injuries. The author, however, suggests the necessity of restrictions of full activities until a CT examination shows complete healing.



CT plate on Admission



CT plate after 15 days

Since then, some articles have discussed follow-up imaging studies and many authors have questioned the need for routine CT or US follow-up. Cuff *et al.*, Navarro *et al.*, and Mizzi *et al.* all retrospectively studied CT and US in both adults and children with blunt hepatic injury.[5,6] They stated that follow-up imaging does not contribute to the final outcome and that, with an asymptomatic patient, either US or CT does not provide additional information.

A known disadvantage of non-operative management of liver trauma is possibility of missing an associated intra-abdominal injury with a reported incidence of 3%. Another disadvantage of conservative management is the development of peri-hepatic abscess which can be safely managed by percutaneous drainage or conservative treatment.

CONCLUSION:

Even grade IV liver injury can be managed conservatively, provided

- 1) Patient is vitally stable with good volume pulse of less than 100/min and systolic Blood Pressure more than 90 mm hg
- 2) It is managed in a tertiary care center accompanied with expert ATLS team.
- 3) With prompt monitoring of patient for vitals, abdominal girth, peritoneal signs, blood investigations on regular basis.
- 4) With expert surgical team facility where patient can be immediately explored if patients condition deteriorates or peritoneal signs appear.
- 5) With 24 hr Radio-imaging facility.

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