

Liver Injury

Key Points

- Liver trauma is amongst the most common life-threatening injuries in trauma patients.
- CT with intravenous contrast is the imaging modality of choice.
- Management is dependent on type of liver injury, haemodynamic parameters and the presence of other injuries.
- Management may be operative or non-operative.
- Liaison with the Trauma Centre within the Trauma Network is imperative

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Abbreviations

AAST	American Association for the Surgery of Trauma
CT	Computerised Tomography
NOM	Non-operative Management
MTC	Major Trauma Centre
RCR	Royal College of Radiology
WSES	World Society of Emergency Surgery

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Introduction

Liver Injury is common and potentially life threatening. Its management will often require a multidisciplinary approach with surgeons, radiologists, haematologists and intensivists. Significant injuries, polytrauma or complex cases mandate liaison with the Network Trauma Centre and/or the regional HPB centre. For Frimley Park, all injuries must be discussed with St George's Hospital, Tooting first and the Royal Surrey Guildford thereafter in exceptional circumstances. For Wexham, this is the John Radcliffe Hospital, Oxford. Most patients present with mild or moderate injuries and can be managed non-operatively. In children, non-operative management (NOM) is the optimal treatment. The decision between surgery and non-operative management is dependent on patient factors, haemodynamic status, associated injuries and grade of injury.

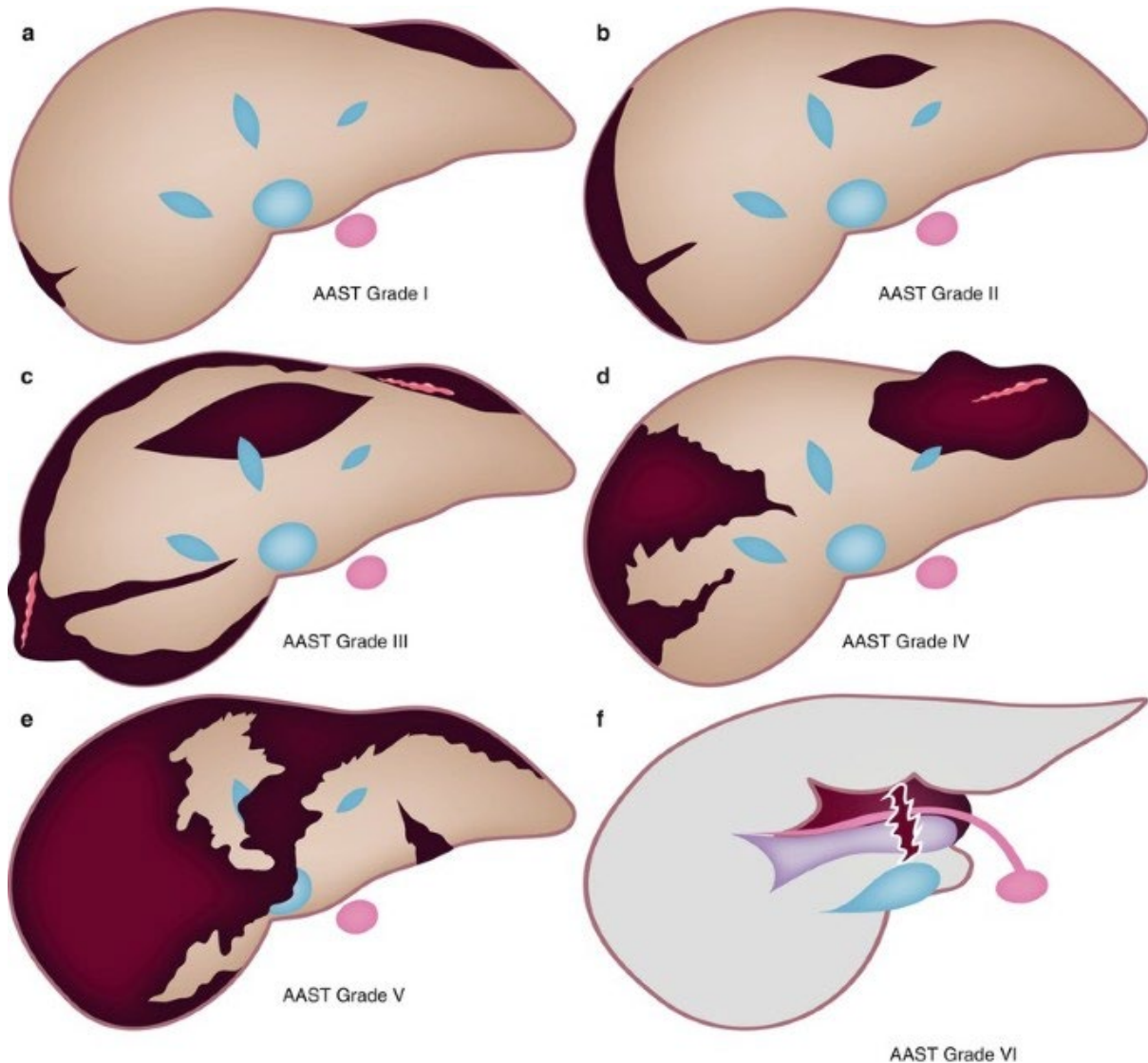
Grade

Grade of injury can be classified according to the AAST classification (Table 1 and Figure 1).

Table 1 - AAST Classification of Liver Injuries

Grade	Injury Type	Injury Description
I	Haematoma	Subcapsular < 10% surface
	Laceration	Capsular tear < 1cm parenchymal depth
II	Haematoma	Subcapsular 10-50% surface area; intraparenchymal, < 10cm diameter
	Laceration	1-3cm parenchymal depth, < 10 cm in length
III	Haematoma	Subcapsular > 50% surface area or expanding, ruptured subcapsular or parenchymal haematoma. Intraparenchymal haematoma > 10cm
	Laceration	> 3cm parenchymal depth
IV	Laceration	Parenchymal disruption 25-75% of hepatic lobe
V	Laceration	Parenchymal disruption involving > 75% of hepatic lobe
	Vascular	Juxtavenous hepatic injuries i.e retrohepatic vena cava/central major hepatic veins
VI	Vascular	Hepatic avulsion

Advance one grade for multiple injuries up to grade III

Figure 1 - Diagram of AAST Classification of Liver Injuries

Diagnosis

- CT scan with intravenous contrast is the gold standard investigation for liver injury in haemodynamically stable trauma patients, or patients deemed safe to scan.
- E-FAST (extended focused assessment with sonography for trauma) is appropriate in the compromised patient unsafe for CT scan and will identify free intra-abdominal fluid.
- There is no role for ultrasound in the assessment of the injured child (as per RCR guidelines).
- N.B. Care must be taken to perform a full assessment of the patient including history, full examination with assessment of haemodynamic status and identification of other injuries, and laboratory tests with appropriate cross matching.

Management

- In haemodynamically stable children, the presence of a contrast blush on CT scan is not an absolute indication for embolisation.
- Serial clinical evaluations (physical exams and laboratory testing) must be performed to detect a change in clinical status if patients are treated NOM.
- NOM should be attempted in the setting of concomitant head trauma and/or spinal cord injuries with reliable clinical exam, unless the patient could not achieve specific haemodynamic goals for the neurotrauma and the instability might be due to intra-abdominal bleeding
- Intensive care unit admission in isolated liver injury may be required only for moderate and severe injuries
- In selected cases where an intra-abdominal injury is suspected in the days after the initial trauma, interval laparoscopic exploration may be considered as an extension of NOM and a means to plan patient management in a step-up treatment strategy.

Figure 2 presents an overview of the management of liver trauma patients, and Figure 3 approaches in unstable individuals. Remember to resuscitate according to international trauma guidelines, including the use of damage control resuscitation where appropriate, massive haemorrhage protocols, assessment and treatment of coagulopathy and other injuries.

Figure 2 - General Management Algorithm for Liver Trauma
(taken from the WSES guidelines)

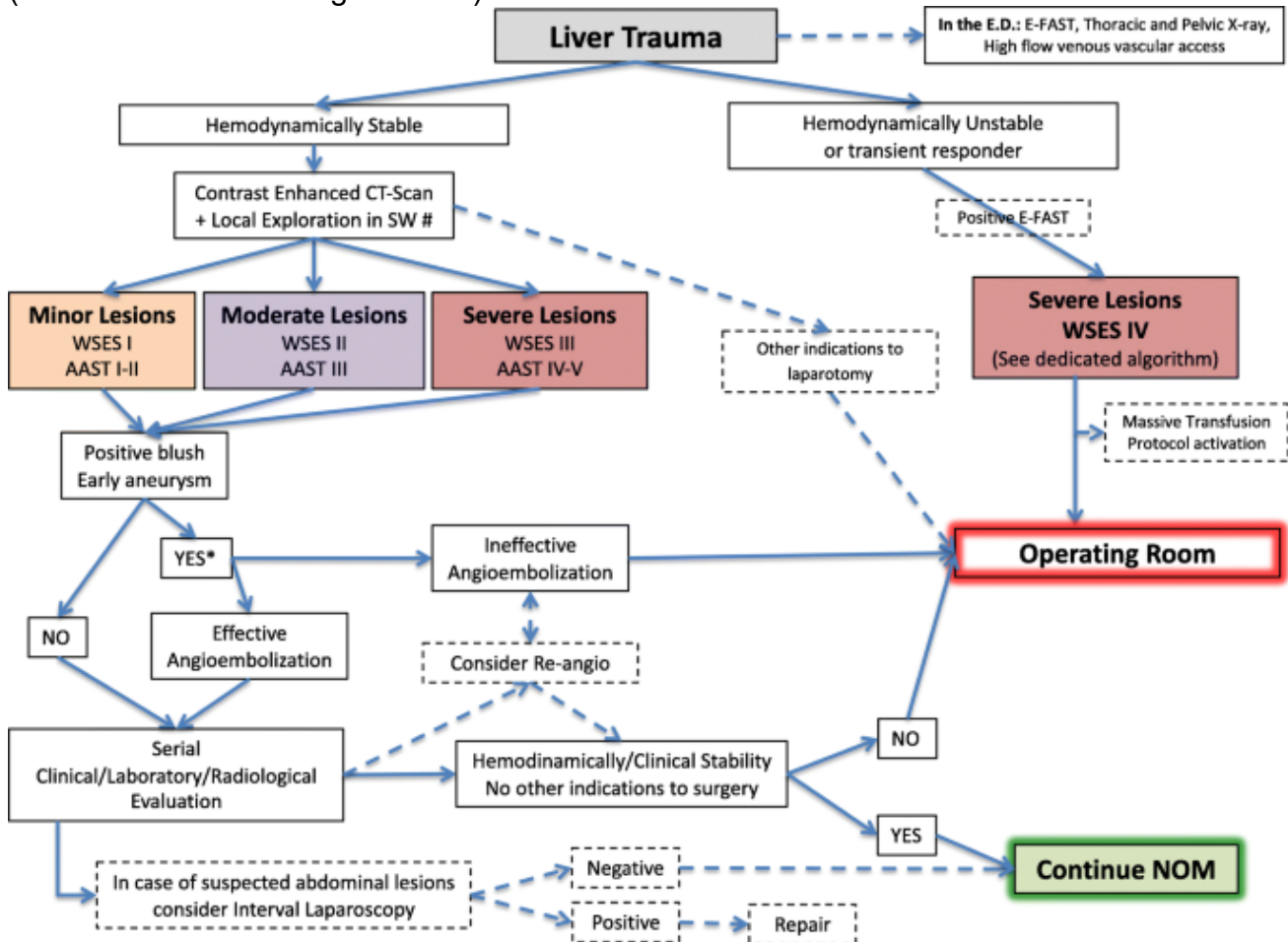
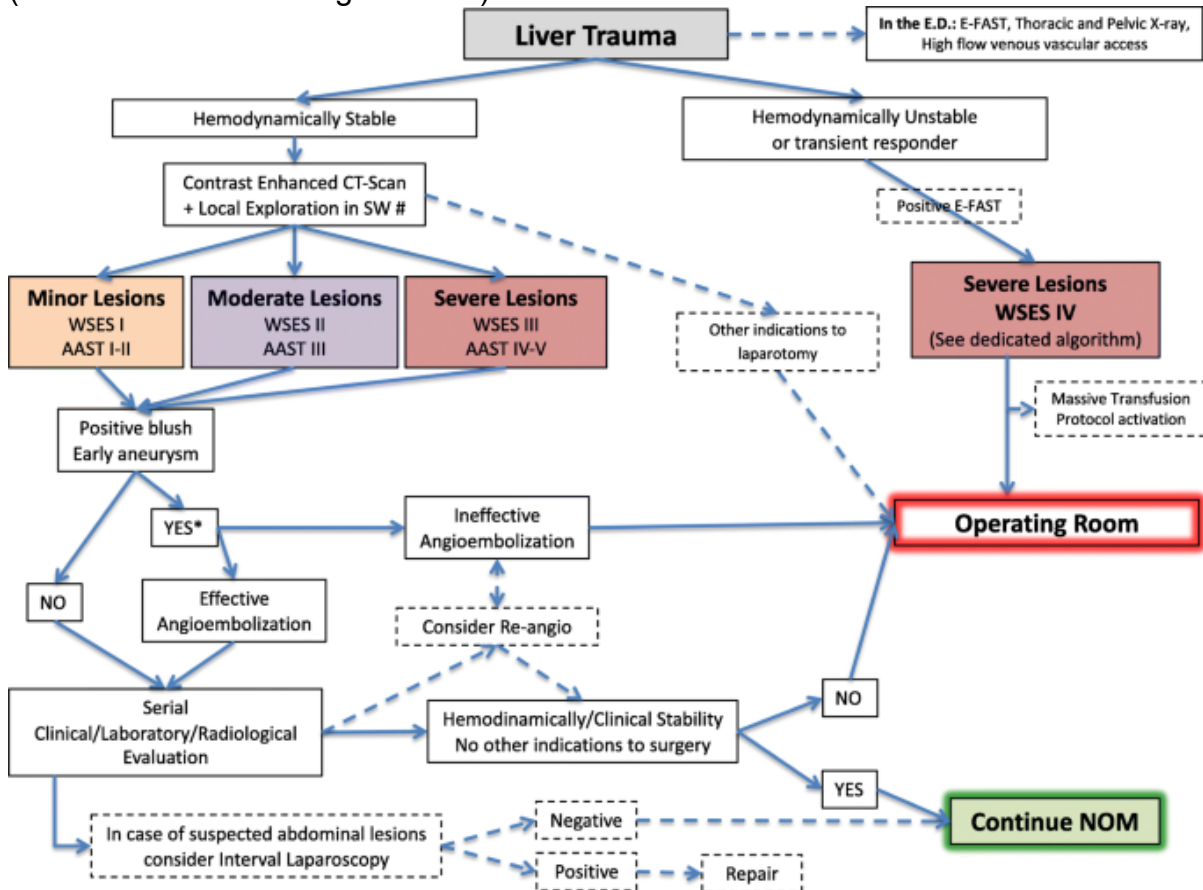


Figure 3 - Haemodynamically unstable liver trauma management algorithm
(taken from the WSES guidelines)



Patients should not be transferred from one Trauma Unit to another (e.g., WPH to FPH) for Interventional Radiology or other procedures. Any patient that is not able to be managed in the Trauma Unit should be transferred to the relevant MTC.

Operative Management

- Haemodynamically unstable and non-responder patients should undergo surgery.
- Primary surgical intention should be to control the haemorrhage and bile leak and initiation of damage control resuscitation as soon as possible.
- Major hepatic resections should be avoided at first and only considered in subsequent operations, in a resectional debridement fashion in cases of large areas of devitalised liver tissue done by experienced surgeons.
- Angioembolization is a useful tool in case of persistent arterial bleeding after non-haemostatic or damage control procedures.

Management of Complications

- Intrahepatic abscesses may be successfully treated with percutaneous drainage.
- Delayed haemorrhage without severe hemodynamic compromise may be managed at first with embolization.
- Hepatic artery pseudoaneurysm should be managed with embolisation to prevent rupture.
- Symptomatic or infected bilomas should be managed with percutaneous drainage.
- Combination of percutaneous drainage and endoscopic techniques may be considered in managing post-traumatic biliary complications not suitable for percutaneous management alone.
- Lavage/drainage and endoscopic stenting may be considered as the first approach in delayed post-traumatic biliary fistula without any other indication for laparotomy.
- Laparoscopy as initial approach should be considered in cases of delayed surgery, so as to minimise the invasiveness of surgical intervention and to tailor the procedure to the lesion.

Feeding and Thromboprophylaxis

- Mechanical prophylaxis is safe and should be considered in all patients with no absolute contraindication.
- LMWH-based prophylaxis should be started as soon as possible following trauma and may be safe in selected patients with liver injury treated with NOM.
- In those patients taking anticoagulants, individualisation of the risk-benefit balance of anticoagulant reversal is suggested.
- Early mobilisation should be achieved in stable patients.
- In the absence of contraindications, enteral feeding should be started as soon as possible.

Follow-Up

- Mandatory late follow-up imaging is not indicated, and it should be used only if the patient's clinical condition and/or symptoms indicating a complication require it for diagnosis.
- The majority of liver lesions heal in about 4 months.
- After moderate and severe liver injuries, patients may usually resume normal physical activities after 3–4 months.
- During the recovery phase, patients should be encouraged to not remain alone for long periods and to return immediately to the hospital in case of increasing abdominal pain, lightheadedness, nausea, or vomiting.

Adapted and Referenced from

Coccolini, F. *et al.* (2020) 'Liver trauma: WSES 2020 guidelines', *World Journal of Emergency Surgery*, 15(24). Available at: <https://doi.org/10.1186%2Fs13017-020-00302-7> (Accessed: 11 June 2024)

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Full version control record

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Version History

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1.0	June 2024	H De'Ath	Final	New guideline

Related Documents

None