Diagnosis and grading of liver injury

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The liver is an extremely well-vascularised organ and blood loss is the major early complication following injury . A high index of suspicion is essential with any chest or upper abdominal stab wound, especially where significant blood loss is obvious. Severe crushing injuries to the lower chest or upper abdomen frequently result in rib fractures, haemothorax and splenic and/or liver injury . Focused assessment sonography in trauma (FAST) performed by an experienced operator will identify free intraperitoneal fluid. In haemodynamically unstable patients with penetrating wounds a laparotomy and/or thoracotomy is indicated once active resuscitation has commenced. Penetrat - ing injuries are frequently associated with massive, continued blood loss and coagulopathies; transfer to the operating resuscitation continues. In haemodynamically stable patients, urgent contrast-enhanced CT scan of the chest and abdomen is performed to look for parenchymal injury and concomitant damage to other thoracic or abdominal organs. The American Association for the Surgery of Trauma liver injury scale was revised in 2018 to incorporate vascular injury such as pseudoaneurysm and arteriovenous fistula. The guide lines recommend dual arterial/portal venous phase imaging (Table 69.5). /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF Penetrating injuries Modern approaches to liver trauma are based on conserva - tive management where possible. The initial management is maintenance of airway patency , breathing and circulation (ABC), following the principles of advanced trauma life - support (ATLS). Peripheral venous access requires tw o large- bore cannulae and blood is sent for cross-match of 10 units of blood, full blood count, urea and electrolytes, liver function tests, clotting screen, glucose and amylase. Initial volume replacement should be with blood; arterial blood gases should be obtained; and the patient intubated and ventilated if gas exchange is inadequate. Intercostal chest drains are indicated if an associated pneumothorax or haemothorax is suspected. Once resuscitation has commenced, the patient should be transferred to the operating theatre, with further resuscitation performed on the operating table. The necessity for fresh-frozen plasma (FFP) and cryoprecipitate should be discussed with the blood transfusion service immediately the patient arrives in the hospital (often by activation of a major transfusion protocol), as these patients rapidly develop irreversible coagulopathies due to a lack of fibrinogen and clotting factors. Standard coagulation profiles are inadequate to evaluate this acute loss of clotting factors, and products should be given empirically aided by the results of thromboelastography if available (see Chapter 2). Blunt trauma Enhanced resuscitation, anaesthesia and intensive care have contributed to reduced mortality rates. Optimum results are obtained with specialist teams that include experienced liver surgeons, anaesthetists, endoscopists and interventional radiol - ogists (Figure 69.8). Initial resuscitation and management are as outlined for penetrating injuries. Unstable patients require immediate lap - arotomy , b ut the majority of haemodynamically stable patients should be managed non-surgically

(management depends on haemodynamic stability not the grade of injury). Haemodynamic instability and signs of generalised peri - tonitis mandate surgical intervention. Interventional radiology with embolisation for hepa tic arterial bleeding is safe and

TABLE 69.5 Grading of liver injuries according to American Association for the Surgery of Trauma. Grade 1 Haematoma: subcapsular, <10% surface area Laceration: capsular tear, <1 /uni00A0 cm parenchymal depth Grade 2 Haematoma: subcapsular, 10–50% surface area Haematoma: intraparenchymal, <10 /uni00A0 cm diameter Laceration: capsular tear 1–3 /uni00A0 cm parenchymal depth, <10 /uni00A0 cm length Grade 3 Haematoma: subcapsular, >50% surface area of ruptured subcapsular or parenchymal haematoma Haematoma: intraparenchymal, >10 /uni00A0 cm Laceration: capsular tear, >3 /uni00A0 cm parenchymal depth Vascular injury with active bleeding contained within liver parenchyma Grade 4 Laceration: parenchymal disruption involving 25–75% hepatic lobe or involves 1–3 Couinaud segments Vascular injury with active bleeding breaching the liver parenchyma into the peritoneum Grade 5 Laceration: parenchymal disruption involving >75% of hepatic lobe Vascular: juxtahepatic venous injuries (retrohepatic vena cava/central major hepatic veins) Additional points: • Advance one grade for multiple injuries up to grade III. • ‘Vascular injury’ (i.e. pseudoaneurysm or arteriovenous /f_i stula): appears as a focal collection of vascular contrast that decreases in attenuation on delayed images. • ‘Active bleeding’: focal or diffuse collection of vascular contrast that increases in size or attenuation on a delayed phase. (a) (b) Figure 69.8 Computed tomography scans demonstrating the signi /f_i cant differences between blunt (a) and penetrating (b) trauma (assault with a kitchen knife).

e ff ective in stable patients. If conservative management is successful patients are discharged after 8–10 days, advised to avoid abdominal trauma and rescanned after 6–8 weeks. If fever, bleeding or pain occurs prompt readmission is required.

Figure 69.9 Packing the liver to achieve haemostasis. The abdomen can then be closed and the patient transferred to critical care for stabilisa tion prior to relook laparotomy 24–48 hours later. (Adapted from Poston GJ, D’Angelica M, Adam R (eds). and pancreatic disorders . Boca Raton: CRC Press, 2010.)

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